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The Strategic Use of Corporate Debt under Product Market Competition: Theory and Evidence

Sasane Lovisuth

A thesis submitted to the degree of Doctor of Philosophy

University of Bath

School of Management

September 2008

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Abstract

Financial and industrial economists are increasingly recognising the interaction between capital structure and firms' strategies in the product market. A debate exists regarding the nature of the relationship between firms' product market power and financial leverage. Particularly, researchers have asked whether the relationship is positive, negative or non-linear.

This thesis contributes to this research agenda by developing game-theoretic models, and conducting empirical tests. Specifically, the thesis examines the effects of *market power* on a firm's use of *long-term debt*. In the theoretical models, following Fairchild (2004b), market power is represented by product differentiation. When firms' products are highly differentiated, firms are considered as having local monopoly power in their own product markets, and thus face low product market competition from each other. As their products become less differentiated (or equivalently, their market power decreases), firms engage in more intense competitive interaction. In the empirical study, following Pandey (2004), Tobin's q is used as the proxy of market power.

In the theoretical study, the relationship between product differentiation, long-term debt, and product market competition is modelled using a framework of non-spatial Cournot competition, and a spatial model with Bertrand competition. Both models generally show that long-term debt softens product market competition. That is, it induces firms to become more myopic as shown by a reduction in output in the non-spatial model and an increase in prices in the spatial model. Furthermore, the study demonstrates that the use of long-term debt depends on degrees of product differentiation. In the non-spatial Cournot model, the all-equity (zero debt) is the financial equilibrium for all levels of product differentiation (in contrast to Fairchild 2004, who demonstrated a non-linear relationship between product differentiation and long-term debt in a Bertrand setting). In the spatial model, the predation effect dominates the use of long-term debt. The equilibrium

debt level is increasing (decreasing) in product differentiation (competitive interaction).

The empirical study investigates the effects of market power (Tobin's q) on long-term, short-term, and total leverage in four Southeast Asian tiger economies. Using panel data and the two-way fixed effects estimation, the study finds that the predation effect dominates when considering long-term debt, whereas the limited liability effect dominates when considering short-term debt. Market power does not seem to have any effect on the *total debt* position of sample firms. Overall, the empirical study demonstrates the complex relationship between capital structure and market power, adding support to Pandey's (2004) empirical analysis and Fairchild's (2004b) theoretical work.

The study also finds evidence supporting the pecking order theory and the agency costs argument. Furthermore, the study employs a two-step generalised method of moments (GMM) technique and finds that sample firms adjust their leverage ratios towards their target levels. The speed of adjustment does not only vary from country to country but it also differs according to types of leverage.

Chapter 1

Introduction

Capital structure research has grown extensively and developed from the seminal work of Modigliani and Miller (1958). According to their irrelevance proposition, M-M I, in a world of perfect capital markets, a firm's value is unaffected by its capital structure. Over the past decades, researchers in corporate finance have focused their attention on the question: what would happen if the strict assumptions of the 'frictionless world' of Modigliani and Miller (1958) did not hold? In asking this, academics have subsequently developed rigorous alternative capital structure theories, and employed data to empirically test their resulting hypotheses. These alternative theories of capital structure have strongly argued that because of the imperfect capital market, a firm's value is not independent of its capital structure, and there exists an optimal capital structure that maximises firm value.

From the mid 1980s, there has been growing attention paid to the interaction between a firm's financial decision and its decisions regarding the product market. Traditionally, the two seemingly unrelated decisions were studied in isolation. The corporate finance literature, which analysed a firm's financial decision, overlooked strategies in the product market. That is, for these researchers the product market is typically assumed to offer an exogenous random return that is unaffected by the firm's debt-equity position. The industrial organisation literature mainly concentrated on a firm's strategies in the product market, whilst ignoring the effect of the firm's capital structure. In other words, the firm's obligations to its investors and the possibility of financial distress are ignored in this modelling of the strategic interaction between the firm and its rivals in the product market. Whilst focusing separately on the financial and the product market decisions is clearly useful in understanding certain aspects of both the firm's financial structure and strategic output market behaviour, a focus on the interaction between

the product market and capital structure offers an alternative interesting insight into the determinants of capital structure.

Turning now to consider the interaction between capital structure and the product market, Harris and Raviv (1991) identified two approaches. The first is concerned with the relationship between a firm's capital structure and the characteristics of its inputs and product. This includes how the firm takes the perception of: customers, suppliers, and employees into consideration, when making its financial decisions. In addition, the approach examines how debt can be used as a bargaining device by the firm or its non-financial stakeholders, to obtain a favourable position.

The second approach, which by far has received the most research attention, examines the relationship between capital structure and product market competition. The approach describes how a firm's financial decision affects its product market strategy, when competing with other firms in the product market. In general, there are two main opposing models that explore the interaction of capital structure and product market competition. First, the '*strategic use of debt*' or '*limited liability*' models, examine how firms can use debt strategically to commit to certain product market behaviour. This argument has been theoretically led by Brander and Lewis (1986), whose model has been extensively assessed and augmented in many subsequent works. Second, the '*deep-pockets*' or '*predation*' models suggest that an unlevered firm has a strategic advantage over its leveraged rival. This argument dates back to the deep-pockets or the long-purse argument of Telser (1966), who suggested that a firm with high retained earnings (deep-pockets) is more able to sustain any losses, as a result of engaging in predatory actions, such as price-cutting or increasing output, until it has successfully driven its highly leveraged rivals out of the market.

Although the research in capital structure and product market competition has extensively grown from the pioneering work of Brander and Lewis (1986), the question of whether debt actually induces aggressive product market behaviour or

softens product market competition, remains. The research, thus far, has shown that the answer to this question depends, not only on the types of product market competition (Bertrand competition versus Cournot competition), but also on the types of product market uncertainty. Recently, there has been increased attention in this research area, which also specifically examines the effect of product differentiation. In the research into capital structure and product market competition with differentiated products, it is argued that the strategic use of debt depends on the degree of product differentiation. Thus far, the research has mainly examined the effect of product differentiation on short-term debt (Wanzenried, 2003; and Haan and Toolsema, 2008) and research into the effect of product differentiation on long-term debt remains sparse. One exception is the work by Fairchild (2004a and b), who examined the effect of product differentiation in Bertrand (price) competition.

Another research area of capital structure and product market, which has not received much attention, is the relationship between the former and product market structure. Up to the present, there has been a continuing debate about the nature of this relationship. On the one hand, there is an argument suggesting that the relationship is linearly positive, owing to the limited liability effect. That is, for strategic purposes, an oligopolistic firm is expected to have higher debt than a firm in perfect competition. On the other hand, the deep-pockets argument of the predation model postulates a negative relationship between capital structure and product market structure. In contrast to the linear relationship, Pandey (2004) has suggested that the interaction between capital structure and product market structure could be non-monotonic, owing to the two opposing effects: the limited liability and predation effects. Pandey (2004) empirically found that a firm strategically uses debt to increase its output and thereby increasing its profits at low and high levels of market power. At the intermediate level of market power, the firm reduces its use of debt, in order to avoid predatory action from less-leveraged rivals.

In fact, it is Pandey's (2004) empirical work on the relationship between capital structure and market power that motivates this thesis' research objective. That is to say, the key research question of this thesis is: how does a firm's market power affect its use of debt in the product market? In order to investigate this, a theoretical study and an empirical investigation to examine the relationship between capital structure and market power are implemented.

First, the term '*market power*' used in this thesis has to be defined. It follows Fairchild's (2004b) definition of the term '*market power*' is adopted and used throughout this thesis. Fairchild (2004b) suggested that when product differentiation is high, each firm is viewed as having local monopoly power in its own product market, and thus the intensity of product market competition is low. As the degree of product differentiation decreases, rivals engage in more intense product market competition, because their *market power* diminishes. Hence, the term '*market power*', in this thesis, refers to high product differentiation or low competitive interaction. The notion of the '*market power*' term used is somewhat different from the more conventional 'market power' term, which refers to the operational meaning of market structure.

In the theoretical study, two differentiated-product models (the first being non-spatial and the second spatial) are developed to examine the relationship between market power, long-term debt, and product market competition. By employing models with differentiated products, the thesis contributes to the growing research area of capital structure and product market competition, under the framework of differentiated products.

In the empirical study, firm-level data for four developing countries from the Southeast Asian region are utilised, to empirically examine the effect of market power on capital structure. The financial information of listed firms across industry sectors are obtained from the CEIC Asia database, available on <http://www.securities.com>. Following Pandey (2004), Tobin's q is used as the proxy for market power. Long-term debt, short-term debt, and total debt,

measured at book value, are used as capital structure proxies. Some firm-specific variables, which are known as determinants of capital structure, are also included as control variables. Therefore, the empirical study not only examines the effect of market power on capital structure, but also its findings contribute to the general research in capital structure, which has traditionally concentrated mainly on the developed countries. In addition, the decision to use three types of debt as the dependent variables also asserts the importance of recognising the differences in the effect that market power may have on different types of debt.

The rest of the thesis is organised as follows. Chapter 2 reviews the literature relating to the research area. In order to provide a general background, this chapter begins with a brief outline of the theories of capital structure that do not relate to the product market. This is followed by a detailed discussion of the literature on the relationship between capital structure and the product market and this section is divided into two sub-sections. The first sub-section reviews the stakeholder theory of capital structure and considers the perception of the non-financial stakeholders and the bargaining role of debt. The second sub-section provides a review of the interaction between capital structure and product market competition. This sub-section also reviews the theoretical arguments of the relationship between capital structure and product market structure. A review of related empirical evidence is given at the end of each sub-section.

In chapter 3, non-spatial and location models of product market competition and debt are developed. The timeline implicit in the models is such that the financial decision is made prior to the product market decision. In the non-spatial model, two firms with similar but differentiated products compete in Cournot (output) competition, within a one-shot game. The model is then extended to incorporate firm myopia and the possibility of collusion over the financial contract within an infinitely repeated game. In this non-spatial model, the exogenous degree of market power is represented by product differentiation. In the location (spatial) model, the effect of market power is examined, which is represented by the transportation cost per unit, on the level of long-term debt, and how this, in turn,

affects Bertrand (price) competition. Three variants of the spatial model are considered: the linear transportation cost case, the quadratic transportation cost case, and the vertically differentiated case.

Chapter 4 begins with a brief review of the theoretical framework, which comprises a review of: measures of capital structure, market power, and other firm-specific determinants of capital structure. This is followed by a description of the data and variables included in the estimation. The estimation strategy comprises the static model and the dynamic panel model. In the former, the linear and non-linear effects of market power on capital structure are studied, whereas in the latter, the speed of the adjustment of capital structure is investigated. The statistical software packages used are STATA (version 9) and EViews (version 6.0).

In the final chapter, chapter 5, conclusions to the analysis of the theoretical models and the outcomes of the empirical investigation are presented. Regarding the former, the interest lies in whether market power has an effect on the use of long-term debt in the differentiated-product models. By way of extension, the empirical study considers short-term debt and total debt, as well as long-term debt in the context of developing countries. Moreover, it aims to elicit whether capital structure and market power act in a positively linear direction or otherwise. The chapter concludes with a brief discussion on limitations of the research, and proposals for avenues for future academic investigation and modelling.

Chapter 2

Literature Review

Financial economists have traditionally analysed a firm's capital structure decision without regard to product market behaviour, whilst industrial economists have focused on product market behaviour, without consideration of a firm's financing decision. However, since Brander and Lewis's (1986) seminal work researchers are increasingly recognising the strategic interaction between the firm's capital structure decision and product market behaviour. This is the focus of the thesis.

In order to set the scene, in this chapter traditional research that analyses corporate financial decisions, without relating them to the product market, are reviewed. The chapter then proceeds to discuss the research into the interaction between capital structure and product market, which motivates the theoretical analysis in chapter 3 and the empirical investigation in chapter 4.

Brealey and Myers (2000) defined capital structure as a mix of securities issued by a firm, ranging from pure debt to pure equity and any hybrid securities, such as convertible debt. It is fundamental for a firm to find a particular combination of capital structure that maximises its overall market value and best appeals to its investors. From this, one might ask the question: 'which combination is the optimal capital structure?' As a consequence, researchers in corporate finance (and perhaps many other relating fields) have been searching for answers. One can observe that the paths to each answer lie in the famous proposition of Modigliani and Miller (1958). With the assumption of a frictionless world, Modigliani and Miller (1958) stated that a firm cannot change the total value of its securities just by splitting its cashflows into different streams. The firm's value is determined by its real assets, not by the securities it issues. The capital structure is irrelevant, as long as the firm's decisions are taken as given. The complete separation of the investment and the financial decision implies that any method of financing, or any

combination of capital structure, is as good as any other. When the strong assumption is relaxed, researchers in corporate finance have argued that the financing decision matters and they are then able to offer answers to the above question about the optimal capital structure. Answers lie in the alternative theories of capital structure, which include: the trade-off theory, the agency costs argument, and the signalling/asymmetric information argument. In addition to these theories of capital structure, starting from the mid 1980s, researchers from both the industrial organisation and corporate finance fields began to recognise that a possible link exists between product market and capital structure. Hence, another answer to the question is possible, deriving from the perspective of a firm's decision in the product market. The aim of this study is to focus on product market competition through the lens of the product market as a whole.

This chapter is organised as follows. In section 2.1, some existing theories of capital structure that are not related to the product market are outlined. Then a review of the literature on the interaction between capital structure and the product market is presented in section 2.2. This section is divided into two sub-sections. The stakeholder theory of capital structure will be reviewed in the first, 2.2.1 and the capital structure and product market competition approach is then discussed in the second, 2.2.2. Each sub-section consists of an overview of theoretical papers and a review of the related empirical evidence. The chapter ends with a brief chapter summary in section 2.3.

2.1 Capital Structure Theories

As briefly mentioned above, Modigliani and Miller (1958) stated that a firm's financial decision is independent of its investment projects. In a world where the capital market is perfect with no taxes, asymmetric information, and agency costs, then there is no combination of capital structure that is better than any other. The firm's market value is given by the discounted future cashflow. Modigliani and Miller (1958) showed that the WACC (the weighted average cost of capital), which is used as the discount rate, is unaffected by the amount of debt. Debt is

assumed to be risk-free. Thus, capital structure is irrelevant as long as the firm's investment decision is taken as given. This proposition of the complete separation of the investment and financing decision, also known as M-M I. Modigliani and Miller (1963) introduced the importance of the tax-shield benefits of risk-free debt, and argued that the expected rate of return on the common stock of a levered firm increases in proportion to the debt-equity ratio expressed in market values, so long as debt is risk-free. This implies that a firm should borrow as much as possible, as debt interest is tax deductible. This is known as their second proposition, M-M II. However, it is more reasonable to suggest that beyond the debt capacity, debt is no longer risk-free. The rate of return on risky debt is higher than that which is at a risk-free rate, and this in turn increases the WACC, thereby reducing firm value. Increasing debt beyond the debt capacity increases the probability of bankruptcy.

If there is a gain from leverage, because of tax deductibility on interest expenses, and if bankruptcy costs are nontrivial, then it is possible to construct a theory of the optimal capital structure, as the tax advantage of debt is traded off against the likelihood of incurring bankruptcy costs. Jensen and Meckling (1976) argued that neither bankruptcy costs nor the existence of tax subsidies can explain the use of preferred stocks or warrants which have no tax advantages, and there is no theory which really explains the fraction of equity claims held by insiders, as opposed the share held by outsiders (no agency costs). Moreover, Jensen and Meckling (1976) argued that according to the M-M II, no debt should ever be used in the absence of tax subsidies. However, there is some evidence of debt having been used prior to introduction of taxes subsidies (Copeland and Weston, 1992).

Modigliani and Miller's (1958) notorious proposition would apply well if firms were operating in an ideal world, with no agency or information problems, but in reality, firms are not operating in such ideal situations and firm value is not independent of capital structure. In the real world, managers may have incentives to act for their own benefit, at the expense of investors, termed the incentive or agency problem. This argument has been led by Jensen and Meckling (1976), who

argued that the existence of agency costs provides strong reasons for arguing that the probable distribution of future cashflows is not independent of capital and ownership structure. They defined the principal-agent problem as a contract under which principals (shareholders) engage an agent (manager or owner-manager) to perform services on their behalf. If their goals are utility maximisation, then it is possible that the agent will not act in the best interests of the principals. In general, there is no way that the agent makes the optimal decision, from the principals' viewpoint at zero cost, because the agent can gain utility from his consumption of non-pecuniary benefits (perks), for example: fancy offices, private jets, and an easy life. These benefits are attractive to the agent, but are of no interest to the principals—in fact they reduce firm value.

Consider a firm which is wholly owned and managed by an owner-manager. This owner-manager will not consume any perks, because he will bear the full cost of such actions. Now suppose that the owner-manager has to raise some capital. If the entrepreneur chooses to issue equity, the firm is then partially owned by outside shareholders. The owner-manager will no longer have full ownership of the firm, and this gives him an incentive to consume perks, as the cost is now partially borne by other shareholders. Consequently, this leads to a reduction in firm value. Rational shareholders expect such behaviour of the agent/owner-manager, and thus engage in some monitoring or disciplinary mechanisms to ensure that the owner-manager cannot take such perquisites. These monitoring and the disciplinary mechanisms are not costless, and the owner-manager will have to bear such cost. This cost is known as the agency cost of equity.

Debt is another option that prevents the agent/owner-manager from consuming perks. It induces him to take fewer perks, as his equity stake rises, resulting in an increase in firm value. However, there is a cost associated with debt. The owner-manager will have an incentive to invest in a risky project, because the owner-manager benefits if it is successful, whereas debt holders will have to bear the loss, if it is not. This is also known as risk-shifting, which causes conflict between shareholders and debt holders. Debt holders will insist on various types of

protective covenants and monitoring devices, in order to protect their wealth from raids made on it by shareholders. However, the costs of these covenants are nontrivial and these costs may increase as the proportion of debt-financing increases. There is an indirect cost of lost investment, which increases when the covenants become more restrictive. The firm loses its flexibility to make investment, financing, and dividend decisions because of restricted covenants. Moreover, the firm faces a higher probability of bankruptcy when its leverage increases. Jensen and Meckling (1976) suggested that an optimal (value maximising) capital structure was obtained by trading off the benefits of debt (increased managerial equity ownership) and costs of debt (risk-shifting). Given increasing agency costs with higher proportions of equity on the one hand and with higher proportions of debt on the other, there is an optimal combination of outside debt and equity that will be chosen, because it minimises total agency costs.

The disciplinary role of debt was also mentioned by Jensen (1986) in his free cashflow model. He posited that a manager with excess cashflow has an incentive to select projects that may or may not have positive net present values, when discounted at the relevant cost of capital. One way to introduce discipline into the investment process is to force the manager to borrow money, as this creates a commitment to make interest payments. Hence, free cashflow is removed from managerial disposal. Moreover, Dewatripont and Tirole (1991) developed a model of managerial moral hazard, which explains how debt is used as a disciplinary mechanism, working on the basis that an unobservable managerial effort level affects a firm's profits. Because debt holders have liquidation rights, if the firm performs badly, a high level of debt induces the manager to exert more effort and work harder to increase the level of profits.

Ross (1977) argued that implicit in the M-M I is the assumption that the market knows the firm's return stream and it values this stream to set the firm value. However, what is in fact valued in the market place, are the *perceived* stream returns for the firm and there is a possibility that changes in the capital structure

may alter the market's perception. In this signalling model, the manager, as an insider, has access to information about the firm's expected cashflow, and will choose to send unambiguous signals about the firm's future. Moreover, such a manager with high ability will use debt as a means of sending favourable signals to the market, in order to distinguish his ability from those with low ability. The latter cannot mimic the same actions, because issuing debt increases the probability of bankruptcy, and they do not have sufficient cashflow to back them up.

Myers and Majluf (1984) expounded the signalling property of equity. Their model assumes that a manager acts in the interests of initial shareholders and one way to encourage this assumption is to make the manager a shareholder. The manager is assumed to know the true future value of the firm and of any projects that it might undertake. Thus, there is asymmetric information about the future prospects of the firm, which is created by the fact that insiders are assumed to know what future state, good or bad, will arise. The market, however, does not know anything except for the expected firm value under each state of nature. When the state of nature turns out to be good, equity is undervalued by the market, and therefore the manager avoids issuing equity. In contrast, when the state of nature turns out to be bad, equity is overvalued by the market, and therefore if the firm issues new equity this will immediately signal to the market that the firm is being overvalued. New investors will realise this and the share price and firm value will fall.

The following numerical example helps illustrate the argument.¹ Consider a situation in which there are two equally likely states of nature. That is, the probabilities of having good news and bad news are 50-50. A firm has current assets of A . The net present value (NPV) of a new project is b , with the initial cash outlay of 100. The value of the firm is V .

¹ The numeral example is taken from Dr. R. Fairchild's MSc. Corporate Finance Lecture Notes.

p = 0.5	Do Nothing		Issue Equity	
	Good	Bad	Good	Bad
A	250	130	350	230
b	0	0	20	10
V	250	130	370	240

The expected firm value when doing nothing = $0.5(250) + 0.5(130) = 190$.

The expected firm value when issuing equity = $0.5(370) + 0.5(240) = 305$.

The expected firm value has increased when the firm invests and issues equity.

The new investors receive 100 and the old shareholders receive most of the payoff, 205.

The old shareholders' wealth can be calculated as follows;

Good news and do nothing = 250

Good news and issue equity = $(205/305) * 370 = 248.69$

Bad news and do nothing = 130

Bad news and issue equity = $(205/305) * 240 = 161.31$

The old shareholders are better off doing nothing in the good state, because the positive NPV project is not large enough to offset the fraction of the ownership that they have to sacrifice by issuing new shares. Thus, the argument that follows this is that the old shareholders cannot take advantage of their inside information, because the very act of issuing new shares in a bad state, i.e. when they think the firm is overvalued, will reveal information to the market that bad news is coming. New investors, who are rational, will recognise this and the share price will fall and thus the firm value will decrease. Because of this signalling property of equity, Myers and Majluf (1984) suggested that a firm should finance its investment with retained earnings, as these contain least signalling cost. When the internal financial resource is exhausted, debt should be issued prior to equity. The argument demonstrated here gave rise to their pecking order theory.

In addition to the alternative theories of capital structure outlined above, Damodaran (2001) suggested that there are three alternative views of how firms

choose a financing mix. Firstly, the choice of debt and equity can be determined using the growth life-cycle model. He argued that firms with high growth should use less debt than more mature firms. This is consistent with Jensen's (1986) free cashflow model, which predicts that young firms with positive growth opportunities should have low debt, because the tax-shield benefit is very small or nonexistent, as earnings are low during the early stages of the firm's life cycle. However, as firms become mature, the separation between owners and managers tends to grow and thus, debt can be used as a disciplinary mechanism. Secondly, firms can choose their financing mix based on a comparison with like firms within the same industry and at the same stage of the life cycle. Lastly, there is evidence that firms may choose to follow a financing hierarchy, from most to least preferred choice between retained earnings, debt, and equity. This is consistent with Myers and Majluf (1984) pecking order theory, in which they argued that debt financing would be preferable to equity, because debt's payoff has lower correlation with the future states of nature.

2.2 Capital Structure and Product Market

Traditionally, in the corporate finance literature, a firm's product market decision is typically assumed to be unaffected by its financial decision. On the other hand, the strand of literature regarding industrial organisation often ignores the strategic effect of a firm's financial decision on product market behaviour. This separation of the financial and the real decision is clearly useful for understanding certain aspects of capital structure and of strategic behaviour in the product market. It was not until the mid 1980s that researchers from both strands started to recognise a possible interaction of the two seemingly unrelated decisions and the importance of considering them mutually. A firm's financial decision can affect and be influenced by its interaction with the product market decision that concerns its non-financial stakeholders, besides its debt holders and shareholders. These non-financial stakeholders are, for example: employees, customers, suppliers, and rivals in the product market. This section provides a review of the existing work,

theoretical as well as empirical, regarding the interaction between capital structure and product market.

This thesis follows Harris and Raviv (1991) and thus classifies the link between capital structure and product market into two approaches. The first approach is known as the stakeholder theory of capital structure, which emphasises the relationship between a firm's financial decision and the characteristics of its product and input factors. The second approach, which has received by far the most attention from researchers, in both the finance and industrial organisation fields, and is the focus of this thesis, discusses the relationship between capital structure and competition in the product market. This approach highlights the strategic interaction of a firm's financial decision and competition in the product market. This chapter now proceeds to review the stakeholder theory of capital structure, and some empirical evidence for this, in sub-section 2.2.1. It then reviews the strategic interaction between capital structure and product market competition and empirical evidence supporting this approach in sub-section 2.2.2.

2.2.1 The Stakeholder Theory of Capital Structure

The approach underlines the relationship between: capital structure, product characteristics, and input factors. Generally, there are two main aspects of the approach; one aspect concerns the perception of the non-financial stakeholders on the firm's financial structure, and the other examines the bargaining role of debt.

a) The Perception of the Non-Financial Stakeholders

Titman (1984) argued that the liquidation and the bankruptcy costs, if incurred, are not imposed only on shareholders and debt holders, but also on non-financial stakeholders. His argument stresses the importance of taking customers, suppliers,

and employees into consideration, when a firm makes its financial decision, because the firm's explicit or implicit contracts with these non-financial stakeholders may have an effect on the firm value. Therefore, the non-financial stakeholders should also be considered, along with financial investors, as claimants to the cashflows. The more indebted the firm is, the higher the bankruptcy and liquidity costs it could incur. If the firm is unable to settle its debt and is forced to liquidate, this might impose some costs on non-financial stakeholders, for example: customers are not able to obtain products, parts, and after-purchase service; suppliers are left with a large input inventory; and employees are made redundant. Foresighted non-financial stakeholders expect these costs associated when dealing with a highly leveraged firm and consequently, these costs might be transferred to the firm's shareholders in the forms of: customers demanding lower prices for the product; suppliers being reluctant to do business or even stopping their deals with the firm; and potential employees might prefer to seek employment from other low-leveraged or non-leveraged firms, who can provide them with more opportunities for advancement. Titman (1984) argued that these effects are particularly more pronounced for a firm that produces a durable or unique product than for non-durable producers. Therefore, a firm, especially a durable good producer for which the above effects are important, should use debt modestly.

Cornell and Shapiro (1987) extended Titman's (1984) explicit claims argument by considering the effects of implicit claims. These implicit claims are what non-financial stakeholders understand they should be provided with by the firm, but prove difficult to specify by contract. They are for example: promises of continuing supply, deliveries made on time, product enhancement, and job security. As the payouts of implicit claims are uncertain, the prices the non-financial stakeholders may pay for these claims will depend on the condition of the firm, including its capital structure. Cornell and Shapiro (1987) suggested that debt has a signalling property that may convey information to the non-financial stakeholders. A firm can use debt to signal its intention to make payment or to bond promised payouts on implicit claims. In other words, the value of these

claims is sensitive to information about the firm's debt level. The firm should therefore consider this information as affecting the price of implicit claims. Thus a product's price should include the value of future service contracts, as well as that of implicit claims. Cornell and Shapiro (1987) argued that a young firm, which relies on its sale of implicit claims but which has not yet developed a large stock of organisation capital, should not use debt excessively. This is because it may face a higher probability of bankruptcy, and hence customers suspect that their implicit claims will not be paid. As a result, they will pay less for the firm's products.

A similar argument to that presented above, in which debt was considered as a signalling device to non-financial stakeholders, has also been presented by Maksimovic and Titman (1991). In their model, debt affects customers' perception of the quality of the product. A firm with products that can be easily switched from high to low quality and with customers who cannot distinguish the quality until they are consuming the products, will be expected to use less debt, *ceteris paribus*. Customers might be reluctant to buy products from a highly leveraged firm, even though there would not be any costs imposed on them, if the firm goes bankrupt (Titman, 1984). This reluctance arises from the firm's inability to honour its promise on implicit contracts and its damaged reputation. Furthermore, Maksimovic and Titman (1991) argued that a firm with a financial shortfall will not reduce the product quality when its financial condition is observable. As debt may affect customer perception of the product quality, the firm with the need to maintain its reputation for being a high quality producer, is expected to ensure that it has less debt. However, if the firm is faced with financial distress, it will reduce the quality of the product in order to avoid bankruptcy, i.e. debt diminishes the firm's incentive to produce high quality.

b) The Bargaining Role of Debt

This aspect of the approach examines how capital structure is used as a bargaining mechanism in a firm-supplier and a firm-employee relation. This bargaining role of debt is thought to be pronounced, particularly in manufacturing industries, because most firms in this sector are often characterised by networks of contractual relations with suppliers, as few of them are vertically integrated. Equally, in some manufacturing industries, firms rely on their employees, especially those skilled workers making specialised products. Thus, suppliers and employees have an important impact on firm value and operating performance. In the firm-supplier relationship, it is sometimes observed that when one party has more bargaining power than the other, the former seeks opportunistic behaviour that violates their mutually beneficial contract. This aspect of the stakeholder theory of the capital structure approach suggests that debt can improve the efficiency of the contract, by reducing the bargaining power of the party seeking opportunistic behaviour. Moreover, it is observed that in firm-employee relations, debt can be used to mitigate threats from labour unionisation.

Subramaniam (1996) analysed the firm-supplier relationship, in which a firm makes an up-front investment and enters into a long-term contract with a supplier. A hold-up problem occurs when the supplier no longer has an incentive to commit to the agreement and demands a larger share of the revenue. Subramaniam (1996) argued that even when the hold-up problem is solved, the underinvestment problem can remain. This is because the firm rationally anticipates that the final revenue will have to be shared with the supplier. It will thus invest up to the point where the marginal surplus accrued to it is zero and this leads to the problem of inefficient investment (i.e. underinvestment). Subramaniam (1996) showed that the underinvestment problem can be mitigated, if the firm issues debt and retires equity, i.e. debt is swapped for equity. As debt holders are the first claimants, increasing the firm's debt reduces the surplus that has to be shared with the supplier. In addition, the increased probability of bankruptcy, due to higher debt,

also increases the firm's incentive to invest, which in turns mitigates the underinvestment problem.

In his subsequent paper, Subramaniam (1998) theoretically analysed the other possible scenario for the hold-up problem; that is when a firm has more bargaining power and seeks opportunistic behaviour. For example, a firm may lower the offered input price once its supplier has incurred set-up costs, or it may demand more features in the product or extra services, such as new packaging and new delivery conditions. However, any foresighted supplier will anticipate such opportunistic behaviour by the firm and as a result of this hold-up problem, fewer suppliers will be willing to provide service to them. This, in turn, leads to higher input prices and fewer sourced inputs, and consequently to a suboptimal production level. Subramaniam (1998) showed that debt can be used as a credible commitment to mitigate the hold-up problem: increasing debt induces a firm to increase its output, which in turn increases the demand of the input quantity, and thus promotes entry in the supplier industry. Furthermore, the model examines the cost of increased debt in terms of the agency problem. The use of debt and the consequent deviation in the firm's output away from the value-maximising level, exacerbates the conflict of interest problems between shareholders and debt holders. The rationally anticipated debt holders will increase the price of debt. Therefore, the optimal financial decision can be obtained from a trade-off between the agency cost and the benefit of improved sourcing efficiency in the supplier market. For the optimally leveraged firm, the equilibrium input costs are lower and output is at its maximising value.

Krishnaswami and Subramaniam (2000) extended Subramaniam's (1998) model to analyse the link between debt financing and product-market decisions, by explicitly incorporating a firm's contractual relations with its suppliers in the strategic interaction between a firm and its rivals. The firm's financing choice is observed, by not only its suppliers, but also simultaneously by its rivals. As discussed by Subramaniam (1998), debt has strategic advantage as it alleviates the hold-up problem in the firm-supplier relation and encourages more suppliers into

the industry. According to Brander and Lewis (1986), debt also induces the firm to capture a fraction of its rival's market share, if they both engage in Cournot competition where outputs are strategic substitutes. That is to say, the firm increases its output, which induces its rival to decrease its output. This is discussed further below in section, 2.2.2. However, Krishnaswami and Subramaniam (2002) argued debt financing as a commitment to larger output and for encouraging more suppliers to service the firm, may not always be profitable to the firm, especially when the supplier industry is endowed with external economies of scale. An industry with external economies of scale, is one that has economies of scale that are external to the firm, but are internal to the industry. In such an industry, increased competition would mean lower minimum average costs and subsequently, lower input prices for all the downstream firms. Therefore, the gains to the firm from encouraging more suppliers to enter the market may be offset by this decrease in industry input costs and the consequent subsidy this provides to the firm's rivals. Therefore, using debt as a strategic commitment helps reduce the input costs of the rival, which enables it to produce more. Moreover, the strategic advantage of debt is lost, if this subsidy effect is large. In sum, a unilateral increase in debt increases the firm's output as well as its rival's, whilst imposing the cost only on the firm.

Another examination of the role of debt in alleviating the hold-up problem by the supplier was given by de Fraja and Piga (2004). Using the principal-agent framework, they showed that the agent (a franchisee or a firm) always chooses higher debt than required in the investment, for strategic purposes. Debt protects the agent from being held up by the principal (a franchiser or a supplier), because it forces the principal to incur part of the initial investment costs. However, debt also increases the likelihood of bankruptcy and decreases the franchiser's expected profits, which induces the conflict of interest problem. de Fraja and Piga (2004) showed that this problem can be solved by an up-front restriction on the franchisee's ability to borrow.

As already mentioned, in a firm-employee relation, debt can be additionally used to protect a firm from threats of labour unionisation. Bronars and Deere's (1991) work showed that debt can be used to protect shareholders' wealth when it faces a threat from labour unionisation. The intuition is similar to Subramaniam's (1996) firm-supplier model discussed above. When bankruptcy is costly, issuing debt obliges the firm to pay a portion of revenue to its debt holders. This limits the revenue the union can extract without driving the firm into bankruptcy. Shareholders will prefer the above method to the strategy of increasing employees' payoffs, in an effort to prevent unionisation. Bronars and Deere (1991) also empirically showed a positive relationship between industry unionisation rates and industry average debt-equity ratios. A similar argument was presented by Perotti and Spier (1993), who suggested that when profits are insufficient to fully meet the promised wages of the employees, a firm can use debt to bargain with them. Issuing debt causes debt-overhang, which presents employees with the credible threat that the firm will forego a profitable investment, if the employees do not agree to a wage reduction.

In addition to the role of debt in alleviating the underinvestment problem, Dasgupta and Sengupta (1993) analysed the cost of debt that a firm may incur when it increases it. In Dasgupta and Sengupta's (1993) model, the firm increases its debt prior to the negotiations with its employees. In the negotiation phase, the expected payoffs to employees are effectively reduced, because debt holders are the first claimants and the higher the debt level, the lower the surplus which accrues to employees. Once the financial decision is made, the employees choose their levels of effort to maximise their payoffs, net of claims by debt holders. Owing to their smaller share of the payoff, the employees choose the level of effort which is not the first-best level. In this way, increasing debt thus raises the moral hazard cost. The optimal choice of debt is therefore derived by balancing the bargaining role of debt against the moral hazard cost of employees. In addition, Dasgupta and Sengupta (2003) showed that the use of debt depends on the bargaining power parameter of the firm: the higher the parameter, the lower the debt the firm employs. Their model demonstrates that the employees' payoff

(net of effort cost) is not necessarily decreasing in the firm's bargaining power parameter. This is because as the firm's bargaining power increases, it reduces debt level, which effectively increases the divisible surplus and as a result, the share of the employees' payoff may increase.

In contrast to the argument presented above, Sarig (1998) argued that debt weakens a firm's bargaining position vis-à-vis employees who possess firm-specific human capital. Facing a greater probability of bankruptcy, a high-leveraged firm is more susceptible to employees' threats to seek other jobs than other, less levered firms. His argument also applies to negotiations with suppliers of specialised input factors, indicating that the manager of a highly leveraged firm is more vulnerable to suppliers' threats to curtail their supply than less leveraged firms. Sarig (1998) also provided empirical evidence that is consistent with his model. He found that the bargaining ability of employees or their level of unionisation is a determinant of the firm's leverage and the share of profits that employees receive is positively correlated with the level of debt.

c) Empirical Evidence

The section proceeds to examine the empirical evidence, from the relevant literature, on the relationship between capital structure and product and input market.

Piga (1998) empirically examined the role of debt in the vertical relationship among Italian manufacturing firms. The results supported the argument that sellers (suppliers) have high debt, in order to alleviate the hold-up problem and to increase their bargaining power, vis-à-vis their buyers. This was shown by the significant and positive relationship between debt and firm supplier.

Kale and Shahrur (2007) carried out an empirical examination of how a firm may use debt to strategically affect a relationship-specific investment with its suppliers

and customers. Their multivariate analysis of industry and firm level data showed that relationship-specific investment, which is proxied by: suppliers' R&D investments, customers' R&D investments, and the intensity of joint ventures and strategic alliances, is negatively related to debt level. This result supports the argument proposed by Titman (1984) and Maksimovic and Titman (1991) that a firm with a unique product, or whose reputation depends on its product quality, should be low leveraged, if it expects to engage in a relationship-specific investment with its customers. The negative effect of the R&D investment is pronounced in firms that belong to concentrated industries and in those firms with a high market share. This finding implies that the effect of customer relationship-specific investments on debt is stronger when there are few alternative suppliers of that product in the industry. The study also addressed the endogeneity problem of the relationship between capital structure and product market, and the results indicate a negative effect of the expected leverage variable on that of R&D investments. This has contributed to the research of the capital structure and product market competition approach, which will be reviewed in the next subsection.

In addition, Kale and Shahrur (2007) investigated the bargaining role of debt and hypothesised that a firm may choose high debt when it faces suppliers or customers who have relatively higher bargaining power. Using industry concentration as the supplier/customer bargaining power, the study found that a firm that faces concentrated suppliers or customer industries tends to have higher levels of debt. This positive effect is weaker for a firm with a high market share in its industry and this suggests that the high market share of the firm is a substitute for debt as a bargaining mechanism.

Matsa (2007) used data on manufacturing firms from the 1970s through to the 1990s, to investigate the effect of the proportion of employees covered by collective bargaining, on current debt and profit. Consistent with Kale and Shahrur (2007), Matsa (2007) empirically found that debt improves a firm's bargaining position when negotiating with labour unionisation. Matsa (2007)

argued that a firm with high liquidity is subjected to demands for higher wages from its employees, so increasing debt reduces the firm's liquidity and thereby lessens labour unions' power.

Frank and Huyghebaert (2006) examined the role of non-financial stakeholder costs as a determinant of capital structure, by using a sample of first-time business start-ups. By using both accounting data and detailed surveys, the study found that an increase in non-financial stakeholder liquidation costs decreases the debt ratio and the proportion of bank loans in total debt. The study found that a firm reduces its vulnerability to the bargaining power of non-financial stakeholders, by limiting its use of debt. This is shown by a decrease in debt ratio and in the proportion of bank loans in the total debt. These findings are consistent with the model proposed by Sarig (1998).

In contrast to Maksimovic and Titman's (1991) view that a firm whose quality and reputation are important to its customers' perceptions should restrict its level of debt, Bandyopadhyay and Das (2005) empirically showed that financial securities, such as debentures and commercial papers, can be used as a signal of firm quality, and they give the firm strategic advantage in the product market. They used a sample of 533 listed Indian firms across industry sectors, from 1989-2000, to test how the use of short-term financial securities, as a signal of firm quality, affected firm performance in the product market. The results show that short-term securities, like debentures and commercial paper, are positively related to sales by the firm. Bandyopadhyay and Das (2005) found that a firm can issue these short-term securities to gain strategic advantage in the product market, for example: reducing capacity constraints, building distribution networks, and engaging in product innovation. They argued that firms that issue these financial securities must pass the scrutiny of the credit agencies or banks that guarantee these loans and therefore, these financial instruments can be viewed as a sign of the good financial health of the firm.

2.2.2 Capital Structure and Product Market Competition

The research that is most relevant to this thesis is now considered, that is to say, this sub-section reviews the approach that examines how a firm's financial decision relates to its own and its rivals' product market strategy. In general, there are two main arguments that offer explanations, regarding the relationship between capital structure and product market competition. The first is the limited liability effect of debt or the strategic use of debt argument that suggests that debt has a strategic use, because it induces a firm to engage in a certain product market strategy. The second argument states that an unleveraged or low-leveraged firm can gain strategic advantage in the product market, by engaging in predatory action to eliminate its highly leveraged rival. This second argument is derived from the long-purse (deep-pockets) argument of the predation model and these two arguments are discussed below.

a) The Limited Liability Effect of Debt

Amongst the pioneering work on this approach, Brander and Lewis (1986) introduced the limited liability effect of debt in a Cournot competition model (i.e. firms competing in output) with homogenous products. Their two-period model analysed the effect of short-term debt on the product market decision, within a static game (i.e. one-shot game). In the first period, firms simultaneously make their financial decisions. They then decide how much output to produce in the second period, given their own and their rival's first period financial decisions. The game ends, the operating profits are realised, and interest is paid out to debt holders, before any net profits can be given to shareholders. In this scenario it is noted that the operating profits are subjected to some random, but favourable, product market uncertainty; the higher the state of product market uncertainty, the greater the operating profits.

Brander and Lewis (1986) theoretically showed that because of product market uncertainty, debt has a strategic use in the product market. Based on Jensen and Meckling's (1976) risk-shifting hypothesis, they argued that the first-period debt induces a firm that maximises its shareholder value and to commit to producing more output, in order to increase profits. Because of the limited liability, the shareholders' losses are protected by the value of salvageable assets (for simplicity, the model assumes these to be zero) and debt holders bear any shortfall in the firm's profits. As the firm increases its debt, and thus its future debt obligations, the critical state in which the firm just breaks even rises, which in turn reduces the number of non-bankrupt states, in which shareholders optimise their payoffs. The low non-bankrupt states become irrelevant to shareholders. Thus, debt induces the firm to pursue a more aggressive product market strategy, i.e. increasing output, to optimise profits, as much as possible, over the 'smaller' non-bankrupt states. In Cournot competition, outputs are strategic substitutes, that is to say, the marginal profit and output of one firm falls as the output of the other firm rises. An increase in debt causes one firm to expand its output at its rival's expense. In this model, both firms make their decisions simultaneously, and therefore they obtain short-term debt and consequently increase their output levels in equilibrium. As a result, firms are worse off because their increased output reduces price levels and thereby decreases their profits. Debt financing in Brander and Lewis's (1986) Cournot competition model, leads to the prisoners' dilemma-like behaviour, namely, both firms increase debt and produce more than they would if debt financing were restricted.

In their companion paper, Brander and Lewis (1988) considered how the bankruptcy effect may have linkage between financial and product output decisions. As before, two firms were engaged in Cournot competition with homogenous products. To avoid the limited liability effect of debt, the model posited that both firms, simultaneously, were making financial and product output decisions to maximise total firm value. The operating profits made were said to be conditional on the firm's and its rival's output, as well as some favourable product market uncertainty. Brander and Lewis (1988) showed that with fixed bankruptcy

costs, debt induces a firm to increase its output in the product market, which is somewhat counterintuitive. One would expect a firm with more probability of bankruptcy, owing to increased debt, to be more conservative. However, Brander and Lewis (1988) suggested a reason for this counterintuitive result was that increasing debt corresponds to high values of the break-even state, in which the firm earns just enough to pay debt holders. Given that the reaction curves are downward and the operating profits rise as the product market uncertainty increases, the firm has an incentive to increase its output for any output produced by its rival. This is similar to the argument given in their 1986 paper. With proportional bankruptcy costs, a U-shaped relationship exists between debt and output. The output is at its minimum where the firm earns just enough operating profits to pay debt holders.

Some criticisms have been made of the validity of Brander and Lewis's (1986) work. An obvious example is that the conclusion from Brander and Lewis's (1986) model does not seem to show that firms are better off with the strategic use of debt in Cournot competition and rather, both firms would be better off if debt was restricted. Another point, as argued by Dastinar (2003), is that Brander and Lewis (1986) did not ensure that the debt taken does not exceed the financial requirement. Some firms might recapitalise by increasing their leverage, in order to fend off takeover attempts and the money obtained from the debt holders may not be invested, but transferred to shareholders. In addition, Brander and Lewis (1986) did not specify how the face value of debt is determined. Although some might doubt the robustness of the specifications in Brander and Lewis's (1986) model, one cannot deny that their model certainly asserts an important linkage between financial and product output decision. That is to say, debt induces a firm to be aggressive in the output decision, and thus the financial and product market decisions should not be made independently. Evidently, subsequent papers were based on their arguments and many used their work as a platform for developing their models, for instance: Maksimovic (1988) analysed a Cournot competition model within a finitely repeated game, Showalter (1995) examined the limited liability effect of debt, when firms compete in Bertrand competition and

Glazer (1994) studied the effect of long-term debt. These papers developed their arguments under the framework that firms produce homogenous goods and along with other relevant papers are now reviewed in more detail below.

Maksimovic (1988) extended Brander and Lewis's (1986) one-shot game model, to examine the sustainability of collusive agreements in an infinitely repeated game, with stationary demand. He showed that the higher the firm's debt, the stronger is its incentive to deviate from the collusive equilibrium, by producing more output. Because of the limited liability effect, debt induces a firm to become more aggressive in the product market, in order to earn higher profits. This is consistent with Brander and Lewis's (1986) argument that debt toughens product market competition. Moreover, in Maksimovic's work (1988) it was shown that debt increases the payoff of deviating, thus causing collusion to be less sustainable. Additionally, Maksimovic (1988) examined factors that determine an upper bound of debt level, at which a grim-trigger strategy, where all firms produce at a collusive output level, can be sustained. This upper bound level of debt depends on: the number of firms in the industry, the discount rate, and the elasticity of demand. He showed that the upper bound level of debt declines as the discount rate increases, and increases as the number of firms in the industry grows and when there is increasing elasticity of demand.

A similar argument was presented by Stenbacka (1994). In a Bertrand competition model with stochastic demand fluctuations, he showed that debt decreases the incentive to sustain collusion. His argument was that because a firm has stronger incentives to deviate from collusion in periods of high demand realisation, an increase in debt reduces the level of demand, above which, the collusive price is not sustainable. In other words, debt raises the number of high demand states, in which a firm has an incentive to deviate from the collusive price agreement. Stenbacka (1994) argued further that an optimal debt level can be derived as a trade-off between this negative incentive effect of debt against the tax-shield benefit.

Many authors have argued that debt does not commit a firm to becoming more aggressive in product market competition. Instead, it induces more collusive behaviour in the product market. This argument has been led by Showalter (1995), who analysed the limited liability effect of debt when firms compete in Bertrand competition. By employing a model in which two firms with homogenous products compete in prices, Showalter (1995) argued that debt does not have strategic use for all types of product market uncertainty, as shown in Brander and Lewis's (1986) model. In Bertrand competition, debt is strategically advantageous under demand uncertainty, but not under cost uncertainty. Because prices are strategic complements in Bertrand competition, the marginal profit and equilibrium price of one firm rises corresponding to a rise in its rival's price. When demand is uncertain, high prices are encouraged through large debt levels. By increasing its debt, a firm optimises over high demand states and therefore chooses a higher equilibrium price. A rival firm reacts by increasing price, raising the expected profit of the leveraged firm. When costs are uncertain, however, a firm taking on debt will place emphasis on low marginal cost states and choose a lower equilibrium price. This will induce its rival firm to decrease its price, causing a decrease in the expected profit of the leveraged firm. Firms that face cost uncertainty will therefore use zero or negative levels of debt, in order to keep the price high. Showalter (1995) showed that, unlike Brander and Lewis (1986), debt softens product market competition, when firms compete in Bertrand competition.

Similarly, Faure-Grimaud (2000) theoretically showed that debt can induce firms to become less aggressive in the product market. In Faure-Grimaud's (2000) model, the debt contract is endogenously written as an agreement between a firm and its lender. Upon repayment, the firm will be rewarded for prompt payment. If the firm is unable to repay its debt, it will not be rewarded. This is also viewed as the firm's bankruptcy cost, which is proportional to the probability of default. The model shows that the bankruptcy cost of debt can dominate the limited liability effect, which then induces the firm to become less aggressive in the product

market, in order to limit the size of the default and to gain more chances of receiving the reward from the lender.

In contrast to Maksimovic (1988), Damania (1997) argued that debt can facilitate tacit collusion. His model can be viewed as an infinitely repeated version of Brander and Lewis's (1986) one-shot game model with stochastic demand uncertainty. Two firms choose their debt levels prior to their output decisions. Then, given their debt levels, they compete over their output levels infinitely. Shareholders optimise their payoffs over non-bankrupt states, whereas debt holders are the residual claimants in bankrupt states. Increases in debt induce firms to optimise over smaller non-bankrupt states and the neglect of the bankrupt states results in a rise in output levels in non-collusive periods. A grim-trigger strategy is played. When a firm reneges on the agreement, the game reverts to non-cooperative Cournot-Nash equilibrium in the very next period and every period thereafter. Damania (1997) showed that because of the limited liability effect of debt, shareholders ignore the low states of demand, in which debt holders optimise their payoffs. Such neglect leads to an increase in output in the Cournot-Nash equilibrium, and thereby reduces payoffs caused by defection. Debt makes defection less desirable, and facilitates tacit collusion.

In addition to Damania's (1997) argument that debt can sustain collusion in the product market, Poitevin (1989a) argued that a common lender can reduce aggressiveness of competition, and facilitate more collusive behaviour. His model showed that when both firms in a duopoly borrow from the same lender, their given interest rates are taken into consideration by their common lender. This is because an increase in a firm's interest rate raises its own output and reduces its rival's output. In order to soften product market competition, i.e. encourage more collusive behaviour, the common lender can reduce the interest rate, in order to induce firms to restrict their output levels. Similarly, Spagnolo (2004) theoretically showed that the collusion effect can be transferred from concentrated/collusive credit markets or large banking groups, to firms in the product market. The collusive creditors can implicitly force firms to commit to

prudent strategies that reduce the potential conflict between shareholders and debt holders, and dampen the limited liability effect of debt. For example, a firm should hire a manager with a valuable reputation or with conservative incentive. Commitment can be made effective across firms in the product market, by the use of renegotiation-proof debt covenants or by having a representative from the collusive lender participate in the firms' boards. Both collusive credit markets and prudent managers, make collusion more sustainable in the product market.

Clayton (1999) modelled the interaction of debt, investment, and product market decision and suggested that when firms compete in imperfect competition, debt and investment give them a strategic advantage. Increasing investment reduces the marginal cost of production and that induces a firm to produce more in the product market. Similarly, increasing debt leads the firm to optimise its profits over only high realisations of demand by producing more output. Debt and investment may be substitutes or complements to one another. When firms compete in Cournot competition, debt induces firms to increase production, which thereby reduces the marginal cost of production and firms thus want to produce and invest more. However, an increase in debt also raises the probability of bankruptcy, and shareholders who would receive nothing if the firms go bankrupt, will invest less when debt increases. Debt and investment are substitutes when the latter effect dominates. Clayton (1999) showed that debt and investment are substitutes in Bertrand Competition. Debt induces firms to increase the price level, and a consequence of these higher prices and debt overhang, is lower investment and weaker product market competition.

As argued by Brander and Lewis (1986), because of product market uncertainty, the limited liability effect of debt commits firms to aggressive product market behaviour. The following papers have considered changes in the limited liability effect of debt, when uncertainty can be resolved. Hughes et al. (1998) analysed a model, in which resolving product market uncertainty can change the strategic incentives of the debt issue. Prior to the financial decision, firms may resolve

uncertainty by acquiring and sharing some information. They argued that information sharing is more important to firms, when facing demand uncertainty rather than cost uncertainty and by sharing information, firms can completely eliminate the former, but not the latter. The implication of the model is that the limited liability effect of debt may be eliminated when the uncertainty is resolved. A similar idea is found in Dasgupta and Shin (1999), who suggested that the possibility of sharing information through a trade association can resolve demand uncertainty. A firm with information would benefit from conveying its information on future market demand to a less-informed, leveraged rival. If the better informed firm conveys the information, the less-informed rival will reduce its output when demand is low, and thereby soften product market competition. Furthermore, Berlin and Butler (1996) argued that a firm can use public debt to commit itself to disclosing information. The firm's private information becomes known to its rivals and this public debt does not have the confidentiality effect that is associated with private debt.

Another perspective was presented by Chowdhury (2006), who tested the implication of Brander and Lewis's (1986) model for the situation where debt and a state of uncertainty are endogenous. To this end, the former was assumed to be used for financing production, whereas for the latter it was taken that a firm is foresighted, and thus knows the exact state in which it earns just enough to repay its debt. Chowdhury (2006) showed that when either debt or uncertainty is endogenous and when both are endogenous, debt leads to a decrease in output, which contradicts the main findings of Brander and Lewis (1986). Chowdhury (2006) argued that when debt and a state of uncertainty are endogenous, a firm does not only choose an output level which maximises the payoff in good states, but it also selects one that minimises the payoff in bad states.

Dastinar (2003) proposed that firms set up their capacity level, and then obtain debt to finance the set-up in the first period. It is assumed that firms can produce output up to their capacity levels with zero cost. In the second stage, they simultaneously produce their output, given the capacity level and financial

contract chosen in the first period. Dastinar (2003) found that although debt increases output levels in the second stage, taking on debt actually reduces returns to the original shareholders. The argument is that debt has a direct effect and an indirect effect on shareholder value. On the one hand, the direct effect causes shareholder value to decrease as debt increases and on the other hand, debt commits a firm, in a Cournot model, to producing large output, as this causes the rival to produce less. This indirect effect of debt increases shareholder value. In Dastinar (2003) the direct effect of debt dominates the indirect effect. The capacity constraint decision, which is made simultaneously with the financial decision, ‘kills’ the strategic benefit of debt (the limited liability effect) that occurs in Brander and Lewis (1986). Therefore, firms are completely equity-financed in equilibrium.

Glazer (1994) extended Brander and Lewis’s (1986) short-term debt model, by analysing the effects of long-term debt on the product market decisions in a Cournot competition model with homogenous products. Glazer (1994) showed that when a firm selects its output level in every period, the accumulated profits strongly affect its product market decision. When profits are high in the given period, the firm has an incentive to become less aggressive in the following periods, that is to say, long-term debt can induce collusive behaviour over some periods of time. In Glazer’s (1994) model, firms simultaneously select long-term debt then compete over two periods of product market. The selected long-term debt induces a firm to be less aggressive, by producing less output in the first period. Given that quantity is a strategic substitute, the rival increases its output and profits. The firm does not deviate from the more collusive output market, because such deviation will lower the rival’s profits and these low profits will force the rival to become aggressive in the second period, which will reduce the firm’s second period profits. However, when the maturity date of long-term debt is close (firms compete in the second period), the firm increases its output in order to gain high profits. In the symmetric equilibrium, both firms reduce their quantities in the first period (more collusive behaviour), but increase their outputs in the second (more aggressive product market strategy). The model shows firms

behave with different strategies, according to whether the maturity date of debt is near or far away.

Breuer and Kleefisch (2002) extended Glazer's (1994) work to analyse the effect of financial innovations on product market competition. In their two-period model implicit collusion is impossible when firms are allowed to borrow short-term debt at the interim period. In Breuer and Kleefisch (2002), prior to the output stage, firms simultaneously select long-term debt. First period profits are realised, but it is assumed that they are insufficient to settle all of the outstanding debt. The model then assumes that firms are allowed to borrow further short-term debt, prior to the second output stage. The second-period profits are realised subject to some product market uncertainty. Long-term debt holders are paid before short-term debt holders are paid. Solving the model by using backward induction, Breuer and Kleefisch (2002) showed that firms compete aggressively in the second period. Unlike Glazer's model (1994), in which firms soften product market competition, i.e. demonstrate collusive behaviour in the first period, Breuer and Kleefisch (2002) showed that the interim short-term debt induces firms to increase their output. The model shows that firms, when faced with additional financial opportunities, find implicit collusive behaviour impossible.

Dasgupta and Titman (1998) analysed the effect of long-term debt on the pricing decision, by using a model with differentiated products. They argued that long-term debt induces a firm to discount its future cashflow heavily. This intuition is based on Myers's (1977) debt overhang problem and Klemperer's (1987) switching cost model. Dasgupta and Titman (1998) found that in Bertrand competition, leverage induces a firm to increase its prices in the product market. Its rival responds to an increase in prices by raising its own prices, if it too is also highly leveraged. They did not examine specifically the effect of product differentiation, but merely found that long-term debt induces more collusive behaviour in the product market.

Baldauf et al. (2000) studied the effect of long-term debt on pricing policy for a new product, within a framework of a two-period Bertrand competition model with differentiated products. Their model assumes that demand uncertainty only prevails in the second period. Given this, they showed that debt induces a firm to increase its prices in the second period, because the firm has an incentive to adopt a pricing strategy that maximises its shareholder value. In the first period, the firm decreases its prices in order to increase its sale.

b) The Long-Purse (Deep-Pockets) Argument of Predation

According to the limited liability approach, firms strategically use debt either to commit to aggressive product market behaviour under Cournot competition (Brander and Lewis, 1986), or to soften Bertrand price competition (Showalter, 1995). In contrast to the limited liability effect approach, the long-purse argument suggests that a leveraged firm is often adversely affected by aggressive action from a non-leveraged or less-leveraged rival. The long-purse argument started with Telser (1966), who suggested that a firm with ‘deep-pockets’, that is one having a greater access to capital, is able to engage in a predatory product market strategy and sustain any consequent losses until it successfully drives its more financially vulnerable rivals out of the market, or prevents them from entering it. The deep-pockets argument is closely related to other predation models, which first date back to McGee (1958), and were subsequently extended by Kreps and Wilson (1982), Milgrom and Roberts (1982), and Saloner (1987).²

In Telser (1966) a financially constrained entrant is vulnerable to an incumbent’s intention to drive the entrant firm out of business. The incumbent, with deep-pockets, is able to sustain losses until it succeeds in eliminating its competitor, i.e. the entrant, under the assumption that the entrant typically has a more vulnerable

² A general description of different types of the predation model is offered in Klevorick (1993). Other forms of the predation model are found in: Kreps and Wilson (1982), and Milgrom and Robert’s (1982b) reputation model, Milgrom and Robert’s (1982a) limit-pricing model, and Fudenberg and Tirole’s (1986) signal-jamming model. Saloner (1987) analysed a model in which an output decision for a takeover commitment can prevent entry from other firms.

financial structure than the incumbent. After entry, the incumbent engages in costly predatory activities, in order to exhaust the entrant financially. However, as argued by Telser (1966) himself, the predation action cannot happen when financial markets are perfect, as the entrant can always secure financing, so long as its entry is profitable.

Although the above argument is persuasive, one might query why some firms are more financially constrained than others. In response to this, Poitevin (1989) provided a formal representation of Telser's (1966) argument, in which the entrant's and the incumbent's financial structures arise endogenously. In his signalling model, the incumbent's cost is known with certainty, whereas the entrant's cost is unknown to the financial market. The entrant has to incur some entry cost, which can only be externally financed. Because information is asymmetric, in equilibrium, the low-cost entrant uses debt to separate itself from the high-cost entrant. Although this invites predation from the incumbent, debt is necessary for the low cost entrant firm to signal its type to investors. Later, Gottesman (2004) showed that with the use of noncallable convertible debt, the low-cost entrant can signal its quality to the financial market, as well as prevent predation action from the incumbent.

A similar argument, based on the adverse selection problem, was presented by Gertner et al. (1988), who argued that when a firm reveals its information to the capital market, its rival in the product market also observes the information. The rival then conditions its product market strategy based on this information, and by doing so, affects the firm's profits. Given that the firm's profits are endogenously determined, its incentives to reveal information to the capital market are affected by product market competition. That is, the structure of the product market determines the character of capital market equilibrium.

Based on the moral hazard problem in financial contracting, Bolton and Scharfstein (1990) presented a model in which financial constraints emerge

endogenously, as a way of mitigating incentive problems. In their two-period model, financial constraints occur because second-period financing is contingent upon first-period profits. The second-period contingency provides a rival with an opportunity to drive down the high debt firm's profits, with the expectation that investors might not extend second-period financing to the leveraged firm. The central argument of their model is that the agency problem in financial contracting can give rise to rational predation. The financial contract that minimises the agency problem also maximises rivals' incentive to be predatory. This suggests that there is a trade-off between deterring predation and mitigating the incentive problem, that is to say, reducing the sensitivity of the refinancing decisions discourages predation, but exacerbates the incentive problem. Depending on the importance of the incentive problem, relative to the predation threat, the equilibrium optimal contract may or may not deter predation. The reliance on external financing exposes the firm to cutthroat competition and this may force it to rely more on internal sources of capital, rather than on external ones. Nevertheless, this reduces the extent to which outside investors monitor the firm and increases the possibility of managerial slack. Hence, external financing comes with costs and benefits: on the one hand, it disciplines management, but on the other it makes the firm more vulnerable in its product market. Their model suggests that an important determinant of product market success is the degree to which firms can finance investment with internal funds.

Following Bolton and Scharfstein's (1990) work that posited that the capital market cannot fully observe a firm's ex-post profits, Fernandez-Ruiz (2004) used a similar idea to develop a model examining the predatory action of an incumbent, when an entrant's ex-ante prospect of a project is not observable by the capital market. In order to mitigate the ex-ante asymmetric information, the entrant may optimally condition its own survival on future assessments by the capital market. This induces the incumbent's response to adversely affect the capital market's assessments, making exit of the entrant more likely.

Kanatas and Qi (2001) examined the incentive of a firm and its rival to manipulate the firm's information given to investors, by distorting output in the product market. They argued that although short-term debt mitigates the moral hazard problem occurring in Bolton and Scharfstein (1990), it may induce the firm to manipulate information flow to the credit market, when it needs to be re-financed some time in the future. The incentive problem occurs, because investors assess the firm's expected future profits on its current costs and similarly assess these for the rival. The current costs are reflected in the level of current profits. This gives an incentive to the firm and its rival to adjust output in the product market, in order to manipulate information to the credit market. Short-term debt induces predatory action from its rival, whereas long-term debt can be used to mitigate the rival's predation. However, long-term debt may not eliminate the continuation of the insider moral hazard problem. A firm's manager has an incentive to shirk his duties or to overinvest.

Some theoretical papers have provided analysis of the relationship between capital structure and the entry decision and can be considered in relation to the argument discussed above. For example, Lambrecht (2001) investigated the impact of debt financing on the entry decision and suggested that in the presence of bankruptcy costs and the absence of taxes, an entrant's need to borrow money tends to delay their entry. On the other hand, however, an incumbent's leverage tends to induce earlier entry. Once entry occurs, the more leveraged firm is then vulnerable to the predatory action of its rival. Cestone and White (2003) argued that an incumbent firm can prevent entry of potential rivals, by increasing the investor's stake in the incumbent firm, and showed that by issuing equity to the investor, its stake in the firm becomes more sensitive to the incumbent's performance. Thus, the investors will have less incentive to fund other potential rivals and entry is prevented.

From another perspective, Showalter (1999b) suggested that debt can be used to deter the entry of a potential rival. Based on the findings in his earlier paper, he argued that with cost uncertainty, an incumbent firm can strategically use debt to

commit to low prices, and thereby deter a potential rival's entry. Under demand uncertainty, deterrence is impossible, that is, the incumbent will instead use debt to soften post-entry product market competition. In addition to Showalter (1999b), Tarzijan (2007) suggested that an incumbent firm can strategically use debt to deter entry in Cournot competition with demand uncertainty. A rational entrant would prefer to enter the market in which an incumbent produces low output. Because of the limited liability effect of debt, the incumbent strategically uses debt to commit to producing more output, thus making the market less attractive to the entrant. This is similar to McAndrews and Nakamura's (1992) argument that an incumbent's debt can deter the entry of potential rivals and debt commits the former to be more aggressive in post-entry product market competition. However, Tarzijan (2007) argued further that since the leveraged incumbent's profits are less than the non-leveraged incumbent's, using debt as a strategic tool is costly. The incumbent will be willing to use debt for strategic reasons when entry can definitely be prevented, however, when there is more than one alternative market available to enter, the incumbent's incentive to borrow will fall.

Another theoretical perspective that suggests how a firm's capital structure changes its product market behaviour was given by Chevalier and Scharfstein (1996), who developed a model which examines changes in the pricing decision of a liquidity constrained firm, during the business cycle. The exogenous changes in economic conditions during the business cycle, consequently lead to changes in the firm's financial condition. This eliminates the possibility that changes in debt levels are affected by a firm's product market decision. Chevalier and Scharfstein (1996) showed that capital-market imperfections induce the liquidity constrained firm to increase its markups (prices) during recessions, but to decrease them during booms. Because of its inability to obtain external funds (owing to the imperfect capital market), the liquidity constrained firm increases its markups to gain short-run profit during times of recession. Given that prices are strategic complements, cash rich (unconstrained) rivals react to the liquidity constrained firm's increased prices, by increasing their prices (markups). Chevalier and Scharfstein (1996) then empirically analysed the effects of the capital market

imperfection on markups, by using data from the supermarket industry. The results support their theoretical argument that markups of a leveraged firm are countercyclical.

In summary, the limited liability approach, reviewed in section 2.2.2a, suggests that a firm strategically uses debt to gain advantage in the product market. The deep-pockets argument of the predation model, reviewed in section 2.2.2b, suggests that a highly levered firm behaves passively in the product market, and is subject to aggressive behaviour by its less leveraged competitor.

c) Debt and Product Market Competition with Differentiated Products

In the previous sub-section, the chapter reviewed the relationship between capital structure and product market competition, within a framework of firms with homogenous products. This view of the relationship is well established in the literature. It was not, however, until the last decade that researchers considered the relationship using a model of firms with *differentiated products*. Indeed, this thesis contributes to this ‘differentiated products’ argument of the capital structure and product market competition research area. Existing models in this research area show that the relationship between debt and product market competition is affected by the degree of product differentiation. For example, Wanzenried (2003) and Haan and Toolsema (2008) suggested that the degree of product *substitutability* can affect a firm’s use of debt in the product market. The effect of product differentiation on leverage was theoretically analysed in Fairchild (2004a and b), whilst Lyandres (2006) examined how debt is affected by the *extent of competitive interaction* among firms.

Wanzenried (2003) considered a two-stage differentiated products Cournot competition model with demand uncertainty. The model analyses how the substitutability of products and the volatility of demand affect the strategic use of short-term debt. Wanzenried (2003) found that short-term debt induces a firm to

become more aggressive in the product market by increasing its output, which is consistent with Brander and Lewis (1986). When firms' products are substitutes or complements, debt holding leads to lower profits in the former case, and higher in the latter. Debt level depends on the product substitutability and demand uncertainty. Wanzenried (2003) showed that there is a U-shaped relationship between debt and product substitutability, and debt is increasing with demand volatility. Haan and Toolsema (2008) re-examined Wanzenried's (2003) and pointed out that when solving for output level, Wanzenried (2003) had made a mistake, by taking the critical demand state at which the firm earns just enough returns to pay debt holders, as given. They argued that the correct way of solving for output level is to take the debt level, rather than the critical demand state, as given, because the critical demand state is a function of the output levels that firms will set. As a result, Haan and Toolsema (2008) found that debt is not increasing with demand volatility, as argued by Wanzenried (2003), but it is in fact decreasing with demand volatility. However, they also found that debt induces a firm to increase its output. Profits for leveraged firms are higher with complementary products, but lower with substitute products.

Fairchild (2004a) introduced the concepts of potential product market competition, capital structure, and actual product market competition.³ In order to do so, he employed a Bertrand competition model with differentiated products to analyse the effect of the degree of product differentiation on long-term debt. The degree of product differentiation represents the potential product market competition. With the use of a numeric example, Fairchild (2004a) showed that when product differentiation is high, both firms choose the all-equity financial contract in equilibrium. As product differentiation reduces, firms increase their level of debt to soften Bertrand price competition.

³ To be discussed in more detail at the beginning of chapter 3.

The model also shows that at a rather low level of product differentiation, firms slightly reduce their debt levels to avoid predation actions, such as price reduction by their rivals.⁴ In his subsequent paper, Fairchild (2004b) also showed that when product differentiation is high, all-equity is the equilibrium financial contract. As product differentiation decreases, firms increase their debt levels to soften the actual price competition. Fairchild (2004b) argued that this is due to the dominating effect of limited liability over the predation effect. Furthermore, the model shows that once the rivals reach a certain low degree of product differentiation, the predation effect becomes dominating and this is shown by a reduction in the firm's level of debt. The decision is made to avoid any potential predation threats, such as price-cutting by the rival.

Lyandres (2006) theoretically examined the extent of competitive interaction, capital structure, and product strategies. Lyandres (2006) showed that when the competitive interaction between firms is high, they will increase their debt level and increase output in strategic substitutes and prices in strategic complement competition. His argument supports the view of Brander and Lewis (1986) and Showalter (1995).

Arping and Loranth (2006) examined the trade-off between the benefits of debt, in terms of managerial discipline and the cost imposed on the customers, who are adversely affected by the potential loss of suppliers for their durable products. The model relates the costs and benefits to the product differentiation. That is to say, if the product is unique, then customer viability is of utmost concern and the firm can mitigate this by reducing its product's uniqueness. However, by reducing product differentiation, the firm is faced with more intense price competition. The firm thus faces another trade-off between softening price competition and a reduction in the cost of customer ownership.

⁴ Note that the 'predation' effect refers to the idea that at low degrees of product differentiation, if a firm sets a high debt level, another firm can 'undercut' by setting lower prices, in order to 'steal' market share. Therefore, both firms reduce debt levels in equilibrium to avoid the potential predation action.

d) The Relationship between Capital Structure and Product Market Structure: Linear or Non-Linear?

Another important product market factor, which according to Istaitieh and Rodriguez-Fernandez (2006) has not received much attention, is market structure. The following arguments have postulated a linear relationship between market structure and capital structure. Krishnaswamy et al. (1992) suggested that conditions of market structure, such as: the number and relative size of buyers and sellers, demand conditions for products, and costs and production conditions, can affect a firm's capital structure. These market conditions can be described, in theory, in terms of: monopoly, oligopoly, and perfect competition. Firms in the same industry, with similar market structure conditions, would be expected to have similar financial policies. Krishnaswamy et al. (1992) argued that the effect on the output production depends on the conditions of market structure. They argued that such an effect would be significant for an industry with a small number of firms and with a high level of influence from rivals on price and quantity. In other words, the limited liability effect is more pronounced in a highly concentrated industry. Accordingly, one would expect the effect to be high in a firm with greater monopoly power, and similarly, one would observe that the effect is more pronounced in an oligopoly than in perfect competition.

Using the agency cost argument proposed by Jensen and Meckling (1976), Rathinasamy et al. (2000) argued that the risk-shifting hypothesis, referring to the conflict of interests between shareholders and debt holders, can also explain the relationship between market structure and capital structure. A manager, acting on behalf of shareholders, has an incentive to invest in risky projects, because any loss is borne by the firm's debt holders. Even with debt covenants, debt holders may still find it difficult to monitor and assess risky projects. In terms of product market competition, the manager might borrow more to pursue a high-risk policy through aggressive output production. Rathinasamy et al. (2000) suggested that the risk-shifting hypothesis, similar to that of limited liability, is more pronounced

in a highly concentrated industry. These theories thus suggest that, a firm in a highly concentrated industry would have more incentive to become highly leveraged than a firm in a less concentrated industry, because the strategic benefit of debt is more pronounced in the former.

In contrast, however, one might expect a firm in a concentrated industry to have low leverage. According to the deep-pockets argument, debt increases the probability of bankruptcy and the financial distress costs and these are particularly high to those firms who are unable to service debt. The implication of the deep-pockets model is that in a highly concentrated industry, where the competition among rivals is intense, a low leverage firm with high reserve funds (deep pockets) would have an incentive to engage in predatory practices. For example, by increasing its output or reducing price level, could financially exhaust its high leveraged rivals and drive them out of the market. Low debt is a strategic mechanism to signal the firm's solvency and its strong position in the industry, thereby deterring any potential predatory actions.

Myers (1977) presented a model in which debt causes under investment. Firms reject those profitable, low risk investment projects that have the possibility of passing on benefits from the debt holders to shareholders. Moreover, internal financing is cheaper than external debt due to asymmetric information. A higher level of debt causes higher output to cost more for a levered firm. In a competitive market, unleveraged or low leveraged rival firms will strengthen competition by increasing their output and lowering price. If the leveraged firms continue borrowing to match the competition, they may be confronted with financial distress and bankruptcy. This effect is more pronounced in a competitive market than in an oligopolistic or a monopoly market. Therefore, the pecking order and the asymmetric information theories predict a negative relationship between capital structure and market structure.

Another argument that might suggest a negative relationship between market structure and leverage is that of Nickell et al. (1997). They argued that debt and

competition have impact on a firm's level of productivity. However, these two factors are substitutes one for another. A firm facing intense competition, i.e. in a highly concentrated industry, does not require a high level of debt to act as a disciplinary mechanism to encourage its manager to commit to high productivity activities.

Contrary to the above arguments, Pandey (2004) empirically found that the relationship between capital structure and market structure may be non-linear. His argument suggested that the non-linear relationship exists, owing to the opposing effects between the limited liability effect and the predation effect. A similar suggestion of the non-monotonic relationship between capital structure and market structure is found in Lyandres (2006). He argued that an oligopolistic firm, whose strategic interaction with rivals is high, will use debt strategically more often than a firm in perfect competition. There is no strategic benefit in holding debt, if a firm is a monopolist in the product market and there are no rivals that can affect the firm's value.⁵ This implies that the relationship between market structure and capital structure may exhibit an inverted U-shaped relationship.

In summary, the theoretical research has debated the relationship between product market structure and debt, suggesting, on the one hand, that the relationship is linearly positive, whereas on the other hand, others have argued that there is a linearly negative relationship. In addition, the possibility that a non-linear relationship can also exist has provided a natural basis for empirical analysis. The next sub-section explores the empirical evidence on capital structure and product market competition.

⁵ Lyandres (2006) merely suggested this and his theoretical and empirical analysis did not specifically examine the relationship between market structure and capital structure.

e) Empirical Evidence

Early empirical evidence in this research area has devoted attention to analysing how debt influences firms' strategic interaction in the product market and has provided, on the one hand, some evidence supporting the limited liability effect argument, which states that debt softens product market competition. On the other hand, it has been proposed that a firm's debt induces an aggressive response from its less leveraged rivals in the product market, which lends support to the predation argument. This series of empirical evidence is led by Chevalier (1995a), who conducted an event-study analysis of the response in firms' returns, when their rival undertook leveraged buyouts in the U.S supermarket industry. Using seemingly unrelated regression estimation, Chevalier (1995a) found that the discounted present value of the expected future profits of a supermarket chain rises, when a rival supermarket announces its leveraged buyout decision. In addition, Chevalier (1995a) found that new supermarket chains are more likely to enter, and the existing rivals expand the market, if a large share of the incumbents in that local market undertook leverage buyouts. This suggests that leveraged buyouts (debt) soften product market competition. In a subsequent paper, Chevalier (1995b) examined changes in prices of supermarkets in the local market, when one of the firms undertook leveraged buyouts. The results showed that a firm that undertook leverage would face price-cutting from its low leveraged rivals, and eventually would exit the local market. This supports the predation argument that a highly leveraged firm is subject to predation action of less leveraged rivals. On the contrary, a price increase was found in a local market, in which rivals were also highly leveraged, when the firm undertook leveraged buyouts. This supports the limited liability effect, suggested by Showalter (1995), that debt softens product market behaviour.

Phillips (1995) investigated the effects of a firm's recapitalisation decision on its own and its rivals' output and the product pricing decision in four concentrated industries the: fibreglass, tractor trailer, polyethylene, and gypsum industries. Using individual firm product sales and cost data, Phillips (1995) found that

market shares of the fibreglass, the tractor, and the polyethylene industries, decreased after a firm in these industries recapitalised. The results showed that whilst the average industry debt was negatively related to output, it was positively related to prices in these three industries. This suggests that debt commits firms in these industries to behaving less aggressively in the product market. By contrast, the results for the gypsum industry showed that the averaged industry debt ratio was negatively related to the industry's product prices, but was positively related to the industry output. Thus it would appear that debt commits firms in the gypsum industry to behave more aggressively in the product market.

Kovenock and Phillips (1997) employed plant-level data, obtained from the Longitudinal Research Database at the Bureau of the Census, to examine product market behaviour following financial recapitalisation. Their results suggest that in a concentrated market, a firm tends to close its plant after recapitalisation, whereas its less leveraged rivals increase their investment and remain in the market. This supports the deep-pockets argument of the predation model.

Grullon et al. (2002) commented on these studies by Chevalier (1995a and b) and Phillips (1995). They stated that if the greater use of debt by a firm is, indeed, associated with it being a less aggressive competitor, whilst its rivals are more aggressive, the question remains: why is there is this effect of debt? A common element of the above research, is that the firms studied increased their leverage significantly, implying that they become financially constrained after leveraged buyouts or recapitalisation. As a result, these firms may not have been able to support further debt, and their insiders may have been unwilling or incapable of providing equity financing or obtaining it from outsiders. Consequently, drawing on the above studies, this would suggest that increased leverage acts to soften a firm's intensity of competition, because of the financial constraints it imposes. A second issue involving the evidence from such research on leveraged buyouts, is that these extreme changes in ownership structure may be motivated by managerial incentive conflicts. In this case, at least some of the observed product

market actions that have been related to increased financial leverage may, in fact, be due to the mitigation of managerial agency problems. Grullon et al. (2002) argued that the evidence from leveraged buyout data is consistent with the suggestion that a firm's use of leverage motivates it to be less aggressive in the product market, but they also argued that further work is needed to better understand this effect and to distinguish between alternative interpretations.

Khanna and Tice (2000) examined whether market-specific and incumbent characteristics affect how incumbent firms respond to new entrants in the discount department store industry. In particular, the study examined the response of the incumbent firms to the entry of Wal-Mart, during the period 1975-1996. The results show that incumbent firms with higher levels of debt respond to Wal-Mart's entry with a low level of investment, whereas the more profitable incumbent firms respond more aggressively by increasing their investment. This result is consistent with the deep pockets argument of the predation model, in that a firm with deep-pockets acts aggressively in the product market, in order to prevent potential entry.

Erol (2003, 2005) used industry level data of Turkish manufacturing industries, from 1989-1999, to examine the effect of debt on pricing decision. The results show that short-term debt has a positive effect on pricing, which supports the argument proposed by Showalter (1995). Erol (2003, 2005) also found that long-term debt has a negative effect on pricing and this is somewhat inconsistent with Glazer (1994), who posited that long-term debt induces more collusive behaviour.

Few studies have examined the effect of capital structure on non-price product market competition. Grullon et al. (2002) studied the effect of leverage on advertising expenditures. Both instrumental variables and reverse causality approaches were adopted, in order to address the endogeneity problem between capital structure and product market competition. They showed that firms that increased leverage, compete less aggressively than their rivals whose leverage was

decreased as a result of new funding. Moreover, the rivals of the sample firms react to their changes in capital structure, by increasing their advertising expenditure (competing more aggressively), if they are less leveraged than the sample firms. Grullon et al. (2002) argued that those firms that reduce their use of debt, as the result of the new funding, increase their advertising competition more than those that increase leverage. They also found that the reaction of the rivals is influenced by capital structure. Rivals behave more aggressively, relative to their peers, if they are less leveraged than the firm that initiated the advertising competition. Their result supports the predation model that states that less leveraged firms are more aggressive than those that increase their debt. Similarly, Schargrodsky (2002) used unbalanced panel data on the U.S. newspaper industry, to explore the effect of capital structure on advertising prices. Schargrodsky (2002) found that debt ratios have a non-significant effect on advertising prices for monopolies, but this effect is significant and positive for oligopolies. His empirical findings are consistent with the limited liability effect of debt argument, which posits that firms engaging in strategic interaction can use leverage to gain advantage in the product market.

Hellmann and Puri (2000) used a unique hand collected dataset, to examine the relationship between the venture capital and product market strategy of high-technology firms in Silicon Valley. The firms were classified into two groups: the innovator and the imitator and the results show that the innovators are more likely to be financed by venture capital than the imitators. The study also found that the presence of venture capital is associated with the shorter time taken by the innovators introduce their products to the market, suggesting that venture capital influences firms bringing their products to the market. The effect is insignificant for the imitators. The effect is particularly important to the innovators, whose fast introduction of their products is valuable. The results of the study suggest that venture capital affects a firm's strategy in the product market and induces the innovative firm to be tough in product market competition.

Clayton and Ravid (2002) examined how capital structure affects the bidding behaviour of firms in auctions. The study used the data of 150 company-bid pairs, from 1994 to 1995, obtained from the FCC (Federal Communication Commission) Spectrum Auctions website. The results of the ordinary least squares regressions show that debt-equity ratio, measured in terms of book and market value, is negatively related to high bid per capital. The higher debt level of the bidding firm tends to lead to lower bids, which suggests that debt softens the bidding competition in auctions.

Lord and Farr (2003) used data on the U.S. integrated mill steel industry, from 1947 to 1980, to test whether debt can be used as a publicly observable collusion device. Prior to the collapse of the collusive basing point pricing system in 1959, subtle forms of tacit collusion were not necessary. The results show that after the collapse of the system, debt is used as a collusive device, and there exists a ceiling on the level of debt each firm can issue. Moreover, firms increase their debts in response to the increased price elasticity of demand. The results also show that colluding firms can increase their debt levels above the ceiling, when convertible debt is included in their capital structure. The results support Maksimovic (1988) who suggested that debt is positively related to the price elasticity of demand, and that convertible security increases the upper bound level of debt, within which collusion is sustainable.

Some empirical studies have addressed the issue of whether debt toughens or softens product market competition. They have examined how the effect of debt on product market competition differs under types of competition, i.e. strategic complements versus strategic substitutes, and under types of product market uncertainty, i.e. demand or cost uncertainty. Showalter (1999b) used a simple cross-sectional linear regression to analyse the effects of demand and cost uncertainty on debt, by using data on 1641 manufacturing firms. The study hypothesised that the positive coefficient of demand uncertainty supports both price and quantity competition. If the negative (positive) coefficient of cost

uncertainty is found, then the results support price (quantity) competition. The results reported a statistically significant relationship between uncertainty and debt. Whilst demand uncertainty has a positive effect on debt, cost uncertainty has a negative effect. This implies that the sample of manufacturing firms strategically use debt, when competing in prices. These results support his earlier theoretical argument (Showalter, 1995) that in Bertrand competition firms increase debt, as demand uncertainty becomes important, but reduce debt as cost becomes more uncertain.

In addition, Erol (2004) employed 15 Turkish manufacturing industries at the two-digit level, from 1990 to 2000, to test whether demand and cost conditions in the product market lead to high short-term or long-term debt. The results of the panel data estimation (the fixed effects estimation), showed that both short-term and long-term debt ratios respond positively to changes in demand, using the proxy of the rate of change in real sales. However, short-term and long-term debt ratios respond differently to changes in cost, as measured by the cost of the goods sold divided by net nominal sales. That is to say, short-term debt responds negatively, whereas long-term debt responds positively. Furthermore, Erol (2004) suggested that short-term debt is expected to motivate price competition, whereas long-term debt is expected to motivate output competition, in the Turkish manufacturing sector.

de Jong et al. (2007) tested the theoretical predictions of Brander and Lewis (1986) and Showalter (1995). Firstly, their study used Sundaram et al.'s (1996) competitive strategy measure (CSM) to categorise sample firms into a Bertrand sample group and a Cournot sample group; subsequently they examined what impact demand and cost uncertainty have on these two groups. The findings show that higher demand and cost uncertainty induce Cournot firms to increase debt levels, which is consistent with Brander and Lewis (1986). For Bertrand firms, the results show that demand uncertainty increases the use of debt, but there is no evidence supporting the role of cost uncertainty among these firms, which supports the argument put forth in Showalter (1995).

Lyandres (2006) empirically examined the effect of strategic interaction among firms on leverage, by using a large sample of U.S. manufacturing industries. The number of firms in an industry and Sundaram et al.'s (1996) competitive strategy measure (CSM) were used as proxies for the extent of strategic interaction. The results show a negative relationship between the number of firms and leverage, and a positive effect between CSM and leverage. This suggests that the higher the strategic interaction among firms, the higher is the debt level. As seen earlier, Lyandres (2006) also showed, theoretically, that firms with high strategic interaction employ more debt to toughen product market competition.

Huyghebaert and Van de Gucht (2002) used a sample of 235 entrepreneurial start-ups, to examine the impact of: competition, debt, and financial market characteristics, on the post-entry exit decision. The results show that the extent of competitive interactions, as measured by the Competitive Strategy Measure, has an effect on the exit decision. The likelihood of exit increases when competitive interactions are strategic complements, but decreases when they are strategic substitutes. In addition, a highly leveraged entrepreneur is subject to an incumbent's predatory action, which results in the former's poor performance. In turn, this affects the perception of the entrepreneur's creditors, regarding the quality of the entrepreneur, and thereby increases the likelihood of exit.

An innovative approach is found in Oechssler and Schuhmacher (2004), who conducted an experiment to test whether the limited liability effect of debt has an effect on a firm's own behaviour, on its rival's, and whether firms select debt strategically. They argued that data limitation often hinders an empirical study from testing the hypotheses, regarding: the limited liability effect of debt, the type of product market competition, i.e. Cournot and Bertrand, and the type of uncertainty, i.e. demand and cost. Their experiment featured three scenarios: Cournot competition, Bertrand competition with demand uncertainty, and Bertrand competition with cost uncertainty. They found that the majority of players choose to increase their output as their debt levels increase and an increase

in the opponent's debt does not yield a significant decrease in a player's own output. This suggests that in Cournot competition, the limited liability effect seems to have a significant effect on players, when they consider their own debt levels, but they tend to ignore the effect of their opponents' debt. The limited liability effect of debt, in Cournot competition, is not as pronounced as predicted in Brander and Lewis (1986). In Bertrand competition experiments, the majority of players choose high debt with demand uncertainty and low debt with cost uncertainty, plus there is a general tendency towards higher and more collusive prices. This is consistent with the argument proposed by Showalter (1995).

Some studies have argued that when a foresighted firm makes its financial decision, it anticipates the product market decision, as a consequence of the financial choice. This implies that product market competition also affects the financial decision. Hence, the relationship between capital structure and product market competition has a two directional effect. This endogeneity issue was addressed in a few empirical studies. For example, Opler and Titman (1994), Chevalier and Scharfstein (1996) and Zingales (1998) have taken advantage of using an exogenous event that causes changes in a firm's debt, to observe the effect of this event on changes in the firm's performance in the product market. Others have used an instrumental variables approach to mitigate the reverse causality issue, see for example, Grullon et al. (2002) and Schargrodsky (2002).

Opler and Titman (1994) employed firm level data from COMPUSTAT, to observe the relationship between financial distress (debt) and a firm's performance during industry downturn. The aim of the study was to test whether highly leveraged firms are more likely to experience performance losses during industry downturn, than other firms. They found that highly leveraged firms, in concentrated industries, experience large decreases in sales and the market value of equity: the loss is competitor driven. This finding supports the deep-pockets argument, that there are gains for unleveraged firms which take advantage of their high-leveraged counterparts. Such an effect is more pronounced in concentrated markets, because there are greater gains to be earned and therefore, the conclusion

is reached that a firm operating in a concentrated market should have low levels of debt.

Chevalier and Scharfstein (1995) used data from 20 manufacturing industries with two-digit SIC code level. The study examined whether markups are countercyclical in industries with a greater proportion of liquidity constrained firms. The results show that industry markups are more countercyclical in more concentrated industries and when controlled for industry concentration, markups are more countercyclical in industries dominated by small firms. This suggests that by increasing price levels, liquidity constrained firms soften product market competition during an economic downturn. Similarly, Chevalier and Scharfstein (1996) also found that markups of a liquidity constrained firm are countercyclical, according to data from the supermarket industry.

Zingales (1998) empirically examined the effects of leverage on the survival of trucking firms, during the eight years following the start of the Cartel deregulation. He argued that deregulation is the exogenous shock that drives the firm's leverage away from the desired level. That is to say, it sharply increases leverage above the desired level, because of the decrease in firm value. Also, as deregulation makes predation more possible, it is likely that the target leverage level decreases at the same time that a firm's real leverage increases dramatically. Thus, these results show that leverage has a negative impact on firm survival. The effect is particularly pronounced in an industry segment that remains imperfectly competitive, even after deregulation. Moreover, Zingales (1998) found that debt decreases the ability of firms to invest, which eventually leads them to exit the industry.

Khanna and Tice (2005) used market-level data of discount department stores to examine pricing and exit decisions across the business cycle. They found that high debt and low efficient firms increase their prices during non-recession years. During recession years, cities with a mix of high debt and low debt firms show a reduction in prices and the high debt firms are more likely to exit. This suggests

that low debt firms engage in predatory pricing to induce the exit of the high debt firms.

Campello (2003) employed two-digit SIC level data from manufacturing industries, to examine the effects of capital structure on business performance, by using aggregate demand shock as a surrogate for demand uncertainty. The results of the industry-level data show that markups are countercyclical in industries in which firms use external finance (debt). This is consistent with Chevalier and Scharfstein's (1996) theory that markups are cyclical. The results prove robust when controlling for industry characteristics, such as: market concentration, industry capacity utilisation, and product demand cyclicity. The results of firm-level data suggest that a highly leveraged firm experiences loss of sales growth, when its rivals in the industry are low leveraged, but this is not found in an industry with highly leveraged rivals.

Borenstein and Rose (1995) examined the effect of bankruptcy announcements on pricing behaviour in the U.S. airline industry. Using data from the seven Chapter 11 bankruptcy filings by large U.S. air carriers, between 1989 and 1992, they found that air carriers that face financial distress reduce their prices prior to filing for bankruptcy, but they do not decrease prices any further after that. Their non-bankrupt rivals do not respond by cutting their prices, but maintain or increase their price levels.

Some empirical evidence on the relationship between capital structure and market structure is now presented. Krishnaswamy et al. (1992) used the simplified definition of the Lerner index, the ratio of the difference between sales and operating expenses to sales, as the market structure proxy. They found a positive relationship between the Lerner index and the debt to total assets ratio, using U.S. data. Similarly, in their study of 49 countries, Rathinasamy et al. (2000) found some evidence that supports a positive relationship between capital structure, measured by total debt ratio and long-term debt ratio, and Tobin's q . Their results are consistent with the limited liability effect and the risk-shifting hypothesis.

Contrary to these studies, Schargrodsky (2002) found a negative relationship between market structure and capital structure. The study, based on data from the U.S. newspaper industry, suggests that firms in oligopolistic competition use more debt than those in monopolistic competition. Moreover, the results show that a firm in oligopolistic competition has higher debt ratios than monopolies, after controlling for other determinants of leverage.

The studies reviewed above have, so far, shown a linear relationship between market structure and capital structure, although the type of the relationship remains inconclusive. Contrary to the above arguments, Pandey (2004) empirically argued that the relationship between capital structure and market structure can be non-monotonic. By using a sample of listed Malaysian companies, Pandey (2004) found a cubic relationship between debt and market power, as proxied by Tobin's q . He argued that the cubic relationship exists, owing to the opposite effects, i.e. the limited liability effect and the predation effect. At low levels of market power, a firm obtains more debt to pursue the output maximisation strategy, to improve its profits and gain market power. The limited liability protects shareholders from any losses occurred, as a consequence of unfavourable market conditions. An increase in the profits of the leveraged firm attracts rivals into the market, which intensifies competition and the firm reduces its use of debt to reduce the probability of bankruptcy and avoid any predation threat from its less leveraged or low leveraged rivals. The predation effect induces the leveraged firm to reduce its use of debt at this intermediate level of market power. After consolidating its market position, i.e. at high levels of market power, the firm once again increases its use of debt to pursue an output maximisation strategy. Thus, the limited liability effect dominates the use of debt at high levels of market power.

The existence of the non-monotonic relationship between capital structure and market structure is consistent with the theoretical argument suggested by Fairchild (2004b) and Lyandres (2006). However, the interpretation of the relationship and

the effect of market structure on capital structure, in these studies, are different to that of Pandey (2004). As reviewed earlier, Lyandres (2006) argued that debt is strategically used when firms compete in oligopolistic competition and debt does not have any strategic use for a firm in perfect competition and monopoly. Therefore, the relationship between capital structure and market structure exhibits an inverted U-shaped. Fairchild (2004b) also suggested an inverted U-shaped relationship between capital structure and market power. His interpretation of market power is that a firm with high market power has low strategic interaction with its rivals, whereas a firm with low market power would engage more intensely in the product market. As the level of market power reduces or equivalently, as the level of strategic interaction increases, a firm strategically uses debt to soften product market competition. As the firm reaches a certain degree of extremely low market power, it reduces its debt level in order to avoid a possible predation threat imposed by its less leveraged rival.

2.3 Summary

Ever since the proposition of Miller and Modigliani (1958), alternative theories of capital structure, such as: the static trade-off model; the agency costs argument; and the asymmetric information model, have offered explanations for a firm's optimal capital structure. These theories of capital structure have examined how costs and benefits of debt (and of equity) can affect a firm's financial decision, under the more realistic assumption of the imperfect capital market.

Growing research interest in the field of capital structure and product market has emerged to offer another explanation of capital structure. The central argument, here, is that a firm should take non-financial stakeholders in the product market into consideration, when deciding on its capital structure. In general, there are two arguments that offer an explanation on the interaction between capital structure and the product market.

Firstly, under the stakeholder theory of capital structure, Titman (1984) explained how the perceptions of non-financial stakeholders, such as: customers, suppliers, and employees, matter to a firm's financial decision, because they have a direct or an indirect interest on the firm's long-term viability. These non-financial stakeholders may demand compensation for any losses they will have to bear, if the firm goes bankrupt, which imposes financial distress costs on the firm whose financial decision introduces the possibility of bankruptcy. Furthermore, the stakeholder theory of capital structure suggests that debt can be used as a bargaining device in the product market.

The second argument focuses on the relationship between capital structure and product market competition, concentrating on the strategic interactions of firms in the product market. One aspect of this, based on the imperfect capital market assumption, suggests that a highly leveraged firm is often subjected to predatory action by its cash rich rivals. This was discussed in this chapter as the deep-pockets argument of the predation model (Telser 1966). Alternatively, there is the proposition that firms in an imperfect product market use debt to gain strategic advantage. This is known as the limited liability effect of debt, which has been rigorously developed since the pioneering work by Brander and Lewis (1986).

Early theoretical models in the capital structure and product market competition research have employed a framework of homogenous products. The effect of capital structure on product market competition still remains somewhat inconclusive. Whether debt induces firms to behave more or less aggressively in the product market depends on: types of competition, types of product market uncertainty, and types of debt. More recent theoretical models have analysed whether other factors of the product market, such as product substitutability or product differentiation, may have an effect on capital structure, and whether their interaction can alter a firm's behaviour in product market competition. These works have shown that increasing product substitutability induces a firm to borrow more short-term debt, and this in turn induces it to be more aggressive in Cournot competition (Wanzenried, 2003; and Haan and Toolsema, 2008).

Fairchild (2004b) found that although long-term debt commits firms to soften product market competition, in Bertrand competition, they may find it optimal to use long-term debt over certain degrees of product differentiation. At some degrees of product differentiation, Fairchild (2004b) demonstrated that the predation effect dominates the limited liability effect, which tempts firms not to use long-term debt excessively. This implies the existence of a non-monotonic relationship between capital structure and market power.

The limited liability effect and deep-pockets arguments of the predation model have been used to explain the relationship between market structure and capital structure. The existing empirical evidence suggests an ambiguous relationship, with some research suggesting a linearly positive relationship and other studies implying a linearly negative one. A third possibility is that there is a non-monotonic relationship (Pandey, 2004 and Lyandres, 2006).

Following on from this literature chapter, the next chapter presents the development of the theoretical models, for this study, that examine the relationship between product differentiation, capital structure and product market competition.

Chapter 3

Theoretical Models

As discussed in the literature review chapter (chapter 2), much attention has been given to the research into the relationship between capital structure and product market competition, both theoretically and empirically. In terms of the theoretical work, the research began with the pioneering paper of Brander and Lewis (1986), who introduced the limited liability effect of debt within a framework of a Cournot competition model with homogenous products. Brander and Lewis (1986) showed that the limited liability effect of debt and some exogenous product market uncertainty, strategically commit a firm to a certain product market strategy that maximises its shareholder value, whilst ignoring the payoffs to debt holders. In their model, the leveraged firm expands its production beyond the output level of an unleveraged firm (standard Cournot output level), to gain higher profits at the expense of its rival. Because the firm and its rival simultaneously make their decisions, both of them select debt and increase their output and their profits are consequently reduced. The output equilibrium is considered to be a prisoner's dilemma and both firms would be better off if debt was restricted. Subsequent theoretical models used Brander and Lewis (1986) as a platform for the development of their models.

Most early works also employed a homogenous products model to further examine the limited liability effect of debt, as suggested in Brander and Lewis (1986) and these models can be considered as variants of the latter model. For example, Maksimovic (1988) examined the effects of debt on the possibility of collusion in the product market. In general, they argued that debt reduces a firm's incentive to collude in Cournot competition with repeated games. Glazer (1994) studied the effects of long-term debt on product market competition, using a Cournot model and discovered that firms behave strategically differently, depending on how far away the maturity date of debt is. Showalter (1995) considered a model of Bertrand competition and the effect of demand and cost

uncertainty and found that increasing debt is strategically used to soften price competition, when demand is uncertain. However, in the case of cost uncertainty, debt has no strategic benefits.

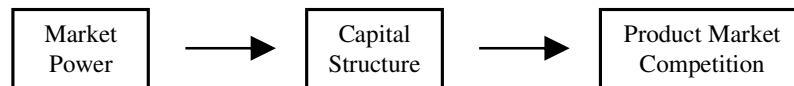
Recently, there has been growing attention paid to examining the relationship between capital structure and product market competition, within a framework of *differentiated and/or heterogeneous*, rather than homogenous products. Dasgupta and Titman (1998) were perhaps among the pioneers in this research area, though their model did not specifically examine the effect of product differentiation on debt, as seen in subsequent papers. Wanzenried (2003) and Haan and Toolsema (2008) studied how debt can be influenced by products' substitutability. Lyandres (2006) examined the relationship between the extent of competitive interaction among firms, capital structure, and product market competition. Another theoretical attempt is found in Fairchild's (2004a and b), model which used an innovative approach to examine the causality between capital structure and product market competition. He argued that the exogenous degree of product differentiation can represent the intensity of the potential product market competition. When product differentiation is high, firms face low intensity of competition, because they are viewed as having local monopoly in their own product markets. As product differentiation increases, firms engage in more intense competition amongst each other, and that affects their strategic use of debt in the product market. This in turn influences how firms make their decisions in Bertrand competition.

The research into capital structure and product market competition has extensively departed from Brander and Lewis (1986). The table below briefly outlines what has been covered so far, in terms of theoretical research and shows what the thesis aims to contribute to the research area.

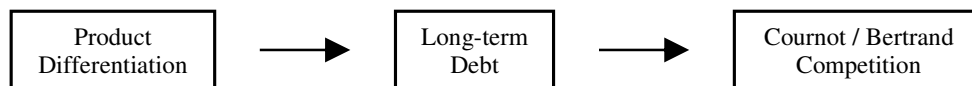
Author (s)	Competition		Product		Debt	
	Cournot	Bertrand	Homogenous	Differentiated	ST	LT
Brander & Lewis (1986)	*		*		*	
Showalter (1995)		*	*		*	
Dasgupta & Titman (1998)		*		*		*
Fairchild (2004a and b)		*		*		*
Wanzenried (2003)		*		*	*	
Haan & Toolsema (2008)		*		*	*	
This thesis	**	**		**		**

** Note that this thesis considers Cournot competition in a non-location framework, and then Bertrand competition within a framework of a location model.

This chapter seeks to augment the research area of capital structure and product market competition, by developing theoretical models to analyse the effect of market power on capital structure, and how this in turn affects firms' strategies in product market competition.



Specifically, the theoretical models examine the effect of product differentiation, which is a proxy for market power, on long-term debt, and how this affects Cournot competition in the non-spatial model, and Bertrand competition in the spatial model.



The novelty of the models being developed here is that long-term debt is not exogenously given, but is determined by the degree of firms' market power. Thus, the models in this thesis examine the relationship between market power and capital structure. As reviewed in the literature review chapter (chapter 2), the relationship between capital structure and market power exists, mainly because of the limited liability effect or the predation effect. The effect of market power on

capital structure has also been empirically addressed in Pandey (2004). However, his notion of market power is the operational term for market structure. In his study, high market power generally refers to a firm in monopoly or oligopolistic competition. The notion of market power in this thesis is taken from the one defined by Fairchild (2004a and b), that is, when a firm has high market power, it is assumed to engage in a less intense potential product market competition, owing to its highly differentiated product. When firms' products are highly differentiated, they are considered to have high market power or local monopoly in their own product market. At low levels of market power, firms face high intensity of potential product market competition from one another.

The thesis will employ two types of model to examine the relationship: a non-spatial model and a spatial (location) model. Firstly, as shown in the table above, the thesis will employ a non-spatial Cournot competition model, with differentiated products, to investigate the effect of product differentiation on long-term debt. The exogenous degree of product differentiation measures a firm's market power or the intensity of the *potential* product competition. The exogenous degree of product differentiation affects firms' financial decisions, and the combined effect between these two, in turn, influences firms' product market decisions in the *actual* product market competition. Secondly, the thesis will employ a location model, in which two firms compete in Bertrand price competition, and incorporate customer preferences. The spatial model studies the impact of market power (represented by the per unit transportation costs) on long-term debt, and how their relationship, in turn, affects the *actual* product market competition. In both models, two firms simultaneously make their financial decisions before their product market decisions. The game theoretic approach is thus employed to solve for Nash equilibriums in financial choice and the product market outcome. The equilibriums are derived by using backward induction; the product market equilibrium for a given financial choice is solved prior to the financial choice equilibrium.

This chapter is organised as follows. In section 3.1, a brief review of Fairchild (2004a and b) is provided, to understand the background to the models developed in this thesis. This is followed by a presentation of a non-location Cournot competition in section 3.2, which, in 3.2.1, includes the model with a one-shot game, which examines the relationship between the degree of product differentiation, financial decisions, and product market decisions. This model is then extended to incorporate sustainability of collusion and firm myopia, within an infinitely repeated game (section 3.2.2). In section 3.3, the development of the second model concerns a capital structure-product market competition relation, within a location model framework. The study will consider three variants of this spatial capital-product market model: horizontally differentiated with linear transportation costs in section 3.3.1, quadratic transportation costs in section 3.3.2, and vertically differentiated in section 3.3.3. It should be noted that models in this chapter are abstracted from other theories of capital structure. Factors affecting capital structure in: the static trade-off theory, the signalling hypothesis, and the agency costs problem, are not taken into consideration. The models mainly focus on the strategic use of debt in the product market and the effects of market power. In section 3.4 the chapter concludes with a brief summary.

3.1 Review of Fairchild (2004a and b)

In order to address the causality issue between capital structure and product market competition, Fairchild (2004a and b) developed an approach to theoretically analyse the effect of a firm's exogenous degree of product differentiation on capital structure, by using a Bertrand competition model with differentiated products. The degree of product differentiation represents *potential* product competition among firms. The effect on capital structure, in turn, influences the firm and its rival in product market competition (*actual* competition). The degree of product differentiation measures each firm's market power or potential product market competition. When firms' products are highly differentiated, the rivals are at their highest market power position. They do not engage in intense product competition, as each of them has local monopoly in

their 'own' product market. On the other hand, firms engage in more intense product competition when their products become less differentiated.

The intuition of Fairchild (2004a and b) is based on Dasgupta and Titman (1998), whose argument is a combination of Klemperer's (1987) view that a firm's pricing decision can be considered as a discounted cash flow problem, and of Myers's (1977) debt overhang problem. Klemperer (1987) suggested that a firm's pricing decision depends on a trade-off between today's and future profits. An incentive to increase or decrease today's price is determined, in part, by its discount rates, as increasing today's price can increase today's profits, at the expense of less future market share and future profits. With higher discount rates, the firm has more incentive to increase today's price for higher today's profits. This insight is combined with Myers's (1977) observation that long-term debt increases the rate at which a firm discounts its future cash flows. The outcome of the combined arguments proposes that long-term debt softens price competition, by inducing the rivals to discount the future cashflow more heavily. Consequently, firms focus on short-term pricing decisions and short-term profits (Dasgupta and Titman, 1998).

Taking it as given that long-term debt induces firms to become more short-termist, Fairchild (2004a and b) examined how the exogenous degree of product differentiation affects the firms' choice of debt, which in turn affects Bertrand price competition and actual firm values. That is, debt increases prices in product market competition. He suggested that the potential product market competition (market power) can be considered as a substitute for debt. When the level of potential product competition (market power) is low (high), firms are able to keep their prices and firm value high with relatively low levels of debt. However, when market power reduces (or equivalently, when potential product market competition increases), the price levels fall. Firms would be expected to increase their debt levels, in order to keep their price levels high so as to soften the *actual* price competition.

With the use of a numeric example, Fairchild (2004a) derived symmetric equilibrium financial contracts for all levels of market power. When the rivals have local monopoly (highest market power or lowest *potential* product competition), both firms choose the all-equity financial contract in equilibrium. As market power reduces (*potential* product competition increases), firms increase their level of debt, to soften Bertrand price competition. However, the effect of debt to soften price competition is not sufficient to prevent prices and firm values from falling, and this is due to the softening effect of debt being outweighed by intense competition. The model also shows that at a rather low degree of market power (intense potential product competition), firms slightly reduce their debt levels. The intuition behind this is that when product differentiation is low, a firm reduces its debt to avoid the predatory action of price reduction by its rival.

Based on the analysis of his previous paper, Fairchild (2004b) subsequently formally derived equilibrium prices, debt level, and firm values. He developed a Bertrand duopoly model with differentiated products, in which firms compete in price levels for two periods. Customers, who buy from one firm in the first period, are assumed to buy from the same firm in the second period. Upon deciding how much to charge their customers in the first period, firms face a trade-off between profits in two periods. The higher the first period price, the higher are the first period profits, however, this trades off with the lower second period profits, because of the lower market share. In addition, firms face actual Bertrand price competition from each other. In summary, there are two forces driving prices down, which are Bertrand price competition and the firms' desire for a long-term market share. Fairchild (2004b) showed that increasing long-term debt softens price competition, by inducing firms to focus on short-term pricing and profits. Because firms are less interested in their future market share, they compete less aggressively in short-term prices. The results show that when each rival has local monopoly power, all-equity is the equilibrium financial contract. As product differentiation decreases (market power decreases), firms increase their debt levels to soften the actual price competition. This shows that the limited liability effect

of debt dominates the predation effect.⁶ Furthermore, the model shows that once the rivals reach a certain low degree of market power (firms' products become less differentiated), the predation effect becomes dominant and this is shown by a reduction in the firm's level of debt. The decision is made to avoid any potential predation threat, such as price cutting from its rival. However, both firms make their decisions simultaneously and therefore they reduce their debt levels at low levels of product differentiation, to avoid predation threats from each other. Fairchild (2004b) theoretically showed that there exists a non-linear relationship between the exogenous degree of product differentiation (market power) and debt and this is consistent with the empirical study of Pandey (2004).

The chapter now proceeds to develop theoretical models to examine the relationship between capital structure and product market competition.

3.2 Non-Spatial Model

3.2.1 Cournot Competition with Product Market Competition (One-Shot Game)

Suppose there are two firms selling similar but differentiated products, for example, both of them are T-shirt producers.⁷ When their products are highly differentiated, such as one of them sells only white T-shirts, whereas the other sells only black T-shirts, each firm is viewed as having local monopoly power in its own product market. That is to say, one firm has the white T-shirt market, whilst the other has the black T-shirt market. As their products become less differentiated, such that their T-shirts become more similar in terms of colour shade, for instance, the white T-shirt is more greyish, whereas the black one is lightened, firms engage in more intense potential competition with each other in

⁶ It should be noted that the predation effect does not imply the strategic bankruptcy effect, as reviewed in the literature chapter. In his model, the predation effect suggests that a firm does not wish to be exposed to a possible predatory action from its rival, whose impact is more pronounced when the firm is leveraged. As a result, the firm avoids the predation action by restricting its use of debt. This interpretation of 'the predation effect' is used throughout the thesis, unless specified otherwise.

⁷ The example of the T-shirt producers is taken from Fairchild (2008).

the product market. In a standard Cournot competition model with differentiated products, the quantity produced and profits decline as firms' products become less differentiated. That is, the actual product competition is softened.

This section employs a Cournot competition model, with differentiated products, to examine whether long-term debt has any strategic use, by committing a firm to a product market decision that increases its profits, as its product becomes less differentiated to that of its rival's. Recall that the limited liability effect of short-term debt induces a firm to increase its output in Cournot competition model. This section will examine whether long-term debt has the same strategic benefit on a firm's product market decision, as it faces more intense potential product competition (product differentiation decreases).

There are three periods in this one-shot game: date 0, date 1, and date 2. Prior to the product market competition occurring in date 1 and date 2, firms must obtain some financial funds for strategic purposes in date 0. For simplicity, the model assumes that firms have the choice of finance from the following options. Firms can select a long-term debt, which matures at the end of the second period of the product market competition, i.e. at date 2. Alternatively, they can choose not to obtain any external borrowing (zero-debt), that is, firms are considered to be all-equity financed. The chosen financial contracts are observable so there is no asymmetric information. The firm's financial structures have an effect on its competing strategy, as well as its rival's. Given the firm's and its rival's selected financial contracts, firms then simultaneously decide how much output they will produce in date 1. Following Fairchild (2004b) and Dasgupta and Titman (1998), the model assumes that customers who buy from a firm in date 1 tend to buy from the same firm in date 2. Because of this customer stickiness, firms have local monopoly in date 2, and can charge their customers the date 2 reservation price. In sum, firms choose their financial contracts once, and these contracts affect the production outputs over the next two periods. The date 2 firms' market shares are anticipated when firms select their date 0 financial structure.

At the end of each product market competition period: date 1 and date 2, profits are realised and paid out to investors. Given that the date 2 reservation price is known to both firms, date 2 profits are realised with certainty.⁸ If the all-equity (zero-debt) contract is selected in date 0, both date 1 and date 2 profits are given to shareholders as dividends. If the long-term debt contract is chosen, only date 1 profits are paid to shareholders, whilst debt holders receive date 2 profits.

For simplicity, the production costs are normalised to zero. The model assumes that both firms are risk-neutral and the risk-free rate is zero. Each firm is faced with a profit maximising problem: they select their financial structures, which maximise their total value or the net present value. The equilibrium concept is a sequentially rational Nash equilibrium in financial contracts and output levels. The output decisions are correctly anticipated by firms, when selecting their financial contracts in the previous date.

The timeline of the model is summarised as follows.

Date 0: each firm simultaneously chooses its financial structure to maximise its expected total firm value. In other words, firms maximise their expected net present value (NPV).

Firms then compete over two periods, dates 1 and 2.

Date 1: firms observe each other's financial structure, and simultaneously set their levels of output to maximise expected returns to shareholders.

⁸ In an earlier version of this model, it is assumed that the product market uncertainty was the date 2 reservation price, which was unknown in date 0 and date 1. This uncertainty was resolved in date 2 in that it was either zero or p_2 , with equal probability. The expected date 2 reservation was therefore $\frac{p_2}{2}$. However, the implication of the model is not changed, even when the date 2 reservation price is known with certainty. For simplicity, the model assumes no uncertainty in the date 2 reservation price.

If the long-term debt contract was selected in date 0, the manager whose goal is to maximise return to the existing shareholders (assume that there is no principal-agent problem), will no longer have an incentive to consider the fortunes of debt holders, when choosing the levels of output. Note that if the all-equity contract was chosen, maximising shareholder value, at this stage, is equivalent to maximising the expected NPV. The date 1 profits are realised and are paid out as dividends to the shareholders.

Date 2: firms charge customers their reservation price, p_2 . The date 2 profits are realised and given to shareholders as dividends, if the all-equity financial contract was selected. Otherwise, they will be paid to debt holders.

As per Shy (1995), the inverse demand functions of Cournot duopoly competition with differentiated products can be expressed as;

$$(1a) \ p_i = \alpha - \beta q_i - \gamma q_j$$

$$(1b) \ p_j = \alpha - \beta q_j - \gamma q_i$$

where p_i and p_j are firm i 's and j 's price levels,

q_i and q_j are their respective quantity levels,

α is the size of the market, and α is assumed to be greater than p_2 .

β measures the sensitivity of own demand. For simplicity, $\beta_i = \beta_j = \beta > 0$,

γ measures the exogenous degree of product differentiation.

When $\gamma = 0$, each firm has local monopoly power (maximum product differentiation or market power). The rival's output levels do not affect the firm's price levels and its output demand. As $\gamma \rightarrow \beta$, firms' products become more substitutable, hence they engage in more intense potential product competition. When $\gamma = \beta$, their products are most substitutable for one another. The rival's quantity has effects on the firm's prices and demand, as much as the firm's quantity does. The model in this section considers only the case where γ represents

the degree of substitutability between the firms' products. Unlike Wanzenried (2003) and Haan and Toolsema (2008), cases where firms' products are complements, $\gamma < 0$, are not taken into consideration. In other words, the model examines only $0 \leq \gamma \leq \beta$.⁹

Let S_i and S_j be firm i and j 's financial choice, respectively. Each firm is allowed to choose, either an 'all-equity' structure; $S_{i,j} = E$, or a 'long-term debt' structure $S_{i,j} = D$, with date 2 repayment value $S_{i,j} = D = q_{i,j}p_2$.

In summary, $S_i, S_j \in \{E, D\}$. Note that by assuming that long-term debt is $D = q_{i,j}p_2$, this means that debt holders have all of the date 2 profits.

Let π_i^1 and π_i^2 be firm i 's expected date 1 and 2 profits, respectively, where;

$$\begin{aligned}\pi_i^1 &= q_i p_i, \\ \pi_i^2 &= q_i p_2.\end{aligned}$$

Similarly for firm j ,

$$\begin{aligned}\pi_j^1 &= q_j p_j, \\ \pi_j^2 &= q_j p_2.\end{aligned}$$

⁹ Recall that Wanzenried (2003) and Haan and Toolsema (2008) developed one-period models, thus effectively they only consider short-term debt, whereas the model in this thesis focuses on long-term debt.

Because firms are risk-neutral with no principal-agent problem, and the risk-free rate is zero, the expected total value of each firm can be written as the sum of the expected two periods' profits, $V = \pi^1 + \pi^2$.

$$(2a) V_i = q_i(p_i + p_2).$$

$$(2b) V_j = q_j(p_j + p_2).$$

Note that the firms' choice of output, q_{ij} , affects the date 1 price. The firms then retain q_{ij} for the second period. The date 2 price (the reservation price), p_2 is given. In contrast with a Bertrand competition model, for example, Fairchild (2004a and b), firms select their date 1 price levels, given their financial contracts. The price levels then affect their output, q .

The non-location Cournot game is solved by using backward induction.

Solving for date 1 quantity decisions for given debt levels

The equilibrium quantities $q_i(S_i, S_j)$, and $q_j(S_j, S_i)$ are solved by taking the date 0 financial contracts, S_i, S_j , as given. Each firm's expected total firm value (V_i and V_j) is obtained by substituting the inverted demand functions (1a) and (1b) into the expected firm value equation (2a) and (2b), respectively:

$$(3a) V_i = \alpha q_i - \beta q_i^2 - \gamma q_i q_j + q_i p_2$$

$$(3b) V_j = \alpha q_j - \beta q_j^2 - \gamma q_i q_j + q_j p_2$$

Both firms select the quantities that maximise their expected values of equity, given their date 0 financial structures. If both firms choose all-equity at date 0, the equilibrium quantities are obtained by differentiating the expected total value of firm, with respect to its own quantity, $\partial V_i / \partial q_i = 0$ for firm i , and $\partial V_j / \partial q_j = 0$ for firm j . Both firms are symmetric, and therefore $q_i^* = q_j^*$ in equilibrium. Note

that the expected total value of the firms, V_i and V_j , is equivalent to the expected equity value, when the rivals select the all-equity financial contract.

Recall the expected repayment values or the expected values of date 2 long-term debt, $D = q_i p_2$ for firm i and $D = q_j p_2$ for firm j , the rivals' expected date 1 equity values, when the firms select long-term debt contracts, can be expressed as Π_i and Π_j for firm i and firm j , respectively;

$$(4a) \quad \begin{aligned} \Pi_i &= V_i - D \\ &= \alpha q_i - \beta q_i^2 - \gamma q_i q_j \end{aligned}$$

$$(4b) \quad \begin{aligned} \Pi_j &= V_j - D \\ &= \alpha q_j - \beta q_j^2 - \gamma q_i q_j \end{aligned}$$

The equilibrium quantities are solved by differentiating the expected equity value, with respect to own quantity, $\partial \Pi_i / \partial q_i = 0$ for firm i and $\partial \Pi_j / \partial q_j = 0$ for firm j , and it is recognised that $q_i^* = q_j^*$ in equilibrium. If firm i chooses the all-equity contract, whilst firm j selects the long-term debt contract at date 0, the equilibrium quantities are solved by $\partial V_i / \partial q_i = 0$ for firm i , and $\partial \Pi_j / \partial q_j = 0$ for firm j .

Throughout the subsequent analysis, equilibrium quantities are denoted as $q_i^*(S_i, S_j)$ and $q_j^*(S_j, S_i)$, and equilibrium values are denoted as $V_i^*(S_i, S_j)$ and $V_j^*(S_j, S_i)$. That is, the first term in brackets always refers to the firm's own financial contract, whilst the second refers to the rival's.

Lemma 1 The equilibrium quantities for each combination of $S_i, S_j \in \{E, D\}$ are as follows:

$$q_i^*(E, E) = q_j^*(E, E) = \frac{\alpha + p_2}{(2\beta + \gamma)}$$

$$q_i^*(D, D) = q_j^*(D, D) = \frac{\alpha}{(2\beta + \gamma)}$$

$$q_i^*(E, D) = \frac{(\alpha + p_2)}{(2\beta + \gamma)} + \frac{p_2\gamma}{(2\beta + \gamma)(2\beta - \gamma)}$$

$$q_i^*(D, E) = \frac{\alpha}{(2\beta + \gamma)} - \frac{p_2\gamma}{(2\beta + \gamma)(2\beta - \gamma)}$$

When $\gamma = 0$, $q_i^*(E, E) = q_i^*(E, D) > q_i^*(D, D) = q_i^*(D, E)$.

When $0 < \gamma \leq \beta$, $q_i^*(E, D) > q_i^*(E, E) > q_i^*(D, D) > q_i^*(D, E)$.

Therefore;

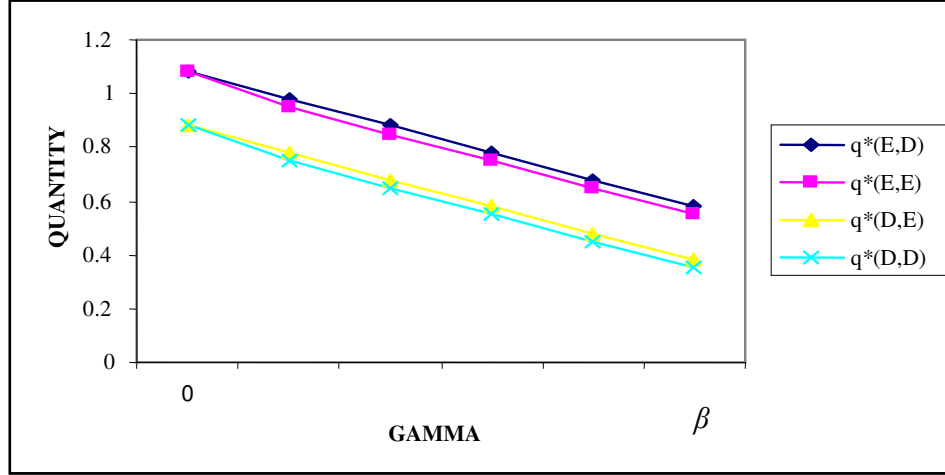
$$\left. \begin{array}{l} q_i^*(E, E) > q_i^*(D, E) \\ q_i^*(E, D) > q_i^*(D, D) \end{array} \right\} \forall \gamma \geq 0.$$

Lemma 1 shows that when each firm has local monopoly power (lowest potential product market competition or highest product differentiation), $\gamma = 0$, its equilibrium quantity, is independent of the rival's financial choice; $q_i^*(E, E) = q_i^*(E, D)$ and $q_i^*(D, D) = q_i^*(D, E)$. Changes in the other firm's financial structure do not affect the firm's own quantity level, and vice-versa.

As the degree of market power reduces (equivalently potential product competition intensifies), such that $0 < \gamma \leq \beta$, the rival's financial choice has an effect on the firm's quantity level. As shown in lemma 1, when firm i chooses the all-equity financial contract, its quantity level is higher when firm j selects long-term debt than when firm j selects the all-equity contract, $q_i^*(E, D) > q_i^*(E, E)$. Similarly, if firm i 's financial contract is long-term debt, it produces more output

when firm j also selects the long-term debt contract, $q_i^*(D,D) > q_i^*(D,E)$. Figure 3.1 below graphically illustrates this.

Figure 3.1: The Equilibrium Quantity Levels given the Firm's and its Rival's Selected Financial Contracts.



As shown in figure 3.1, for all levels of market power (note that when gamma is low (high), market power is high (low)), a leveraged firm has an incentive to reduce its output, regardless of its rival's financial choice: $q_i^*(D,E) < q_i^*(E,E)$ and $q_i^*(D,D) < q_i^*(E,D)$. Recall the strategic use of debt model in Brander and Lewis (1986), short-term debt commits a firm in Cournot competition to becoming more aggressive in the product market, by increasing its level of output. On the contrary, this model shows that long-term debt induces a firm to reduce its output, thereby softening the actual product market competition. This is consistent with Fairchild's (2004b) model. Long-term debt causes a firm in Bertrand competition to become short-termist, by increasing its price level for high short-term profits. The short-termist effect of long-term debt is particularly pronounced at low levels of market power (high gamma or low levels of product differentiation). Firms facing intense potential product competition, heavily discount their future cashflow for short-term profits.

Solving for the date 0 equilibrium financial contracts

In order to solve for the equilibrium date 0 financial contracts, the equilibrium quantities, q_i^* and q_j^* in lemma 1 are substituted into the inverse demand functions, (1a) and (1b), to obtain the equilibrium prices. The equilibrium quantities and prices are then substituted into the expected firm value equations (2a) and (2b), to obtain the firm values $V_i(S_i, S_j)$ and $V_j(S_j, S_i)$, for each combination of financial choices: $V_i(E, E)$, $V_i(D, D)$, $V_i(E, D)$, and $V_i(D, E)$. Finally, the date 0 equilibrium financial contracts are obtained by solving the Nash equilibrium of the firm values, in the normal form game.

Lemma 2 The firm values for given $S_i, S_j \in \{E, D\}$ are;

$$V_i(E, E) = \frac{(\alpha + p_2)}{(2\beta + \gamma)} \left[\alpha - (\beta + \gamma) \left(\frac{\alpha + p_2}{2\beta + \gamma} \right) + p_2 \right]$$

$$V_i(D, D) = \frac{\alpha}{(2\beta + \gamma)} \left[\alpha - (\beta + \gamma) \left(\frac{\alpha}{2\beta + \gamma} \right) + p_2 \right]$$

$$V_i(E, D) = \left[\frac{\alpha + p_2}{2\beta + \gamma} + \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right]^* \left[\alpha - \beta \left(\frac{\alpha + p_2}{2\beta + \gamma} + \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right) - \gamma \left(\frac{\alpha}{2\beta + \gamma} - \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right) + p_2 \right]$$

$$V_i(D, E) = \left[\frac{\alpha}{2\beta + \gamma} - \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right]^* \left[\alpha - \beta \left(\frac{\alpha}{2\beta + \gamma} - \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right) - \gamma \left(\frac{\alpha + p_2}{2\beta + \gamma} + \frac{p_2 \gamma}{(2\beta + \gamma)(2\beta - \gamma)} \right) + p_2 \right]$$

When $\gamma = 0$, $V_i(E, D) = V_i(E, E) > V_i(D, D) = V_i(D, E)$,

$$\gamma \in (0, \gamma_c], V_i(E, D) > V_i(E, E) > V_i(D, D) > V_i(D, E),$$

$$\gamma \in (\gamma_c, \beta], V_i(E, D) > V_i(D, D) > V_i(E, E) > V_i(D, E),$$

$$\text{where } \gamma_c = \frac{P_2}{\alpha} \beta.$$

Lemma 2 demonstrates that when each firm has local monopoly power ($\gamma = 0$), the value of the firm, given its selected financial contract, is not affected by its rival's financial contract: $V_i(E, D) = V_i(E, E)$ and $V_i(D, D) = V_i(D, E)$. However, the firm value when the all-equity contract is chosen is greater than when the long-term debt contract is chosen, regardless of the rival's financial contract [$V_i(E, E) > V_i(D, E)$ and $V_i(E, D) > V_i(D, D)$]. As the degree of market power (potential product competition) decreases (increases), $0 < \gamma \leq \beta$, the firm value is affected by its own financial contract, as well as its rival's. If the firm chooses the all-equity contract, its firm value is higher when its rival selects the long-term debt contract, than when the rival chooses the all-equity contract: $V_i(E, D) > V_i(E, E)$. Similarly, if the long-term debt contract is chosen, the firm value is higher when its rival also chooses the long-term debt contract: $V_i(D, D) > V_i(D, E)$.

The Nash equilibria of the normal form game are solved for all levels of market power.

$\forall \gamma \in [0, \beta]$	Equity		Long-term debt	
	-	+	-	
Equity	$V_i(E, E)$	$V_j(E, E)$	$V_i(E, D)$	$V_j(D, E)$
		+		
Long-term debt	$V_i(D, E)$	$V_j(E, D)$	$V_i(D, D)$	$V_j(D, D)$

The table above shows that each firm's dominant strategy is to choose the all-equity financial contract at all levels of market power. A critical value of market power, γ_c , is defined, such that $V_i(D, D) = V_i(E, E)$ at $\gamma_c = \frac{P_2}{\alpha} \beta$. Note the contrast to Fairchild's (2004b) Bertrand competition model that showed an increasing of

debt at low levels of market power, as a commitment to increasing prices. This model shows that even when the products become less differentiated, in equilibrium, both firms select the all-equity financial contract, which consequently commits them to higher output levels.

Therefore, the model states the following.

Proposition 1

Each firm's dominant strategy is the all-equity financial contract, therefore each is $S_{i,j} = \{E, E\}$ for all levels of market power.

- a) At $\gamma \in [0, \gamma_c]$, the firm's equilibrium firm value is greater than that when they both choose long-term debt. That is, $V_i^*(E, E) > V_i(D, D)$.
- b) When the level of market power is beyond the critical value, $\gamma \geq \gamma_c$, this represents a prisoner's dilemma. Each firm would be better off if they both chose long-term debt, since, $V_i^*(E, E) < V_i(D, D)$.

Figure 3.2 illustrates the above arguments.

Figure 3.2: The Firm Values given the All-Equity and Long-term Debt Financial Contracts

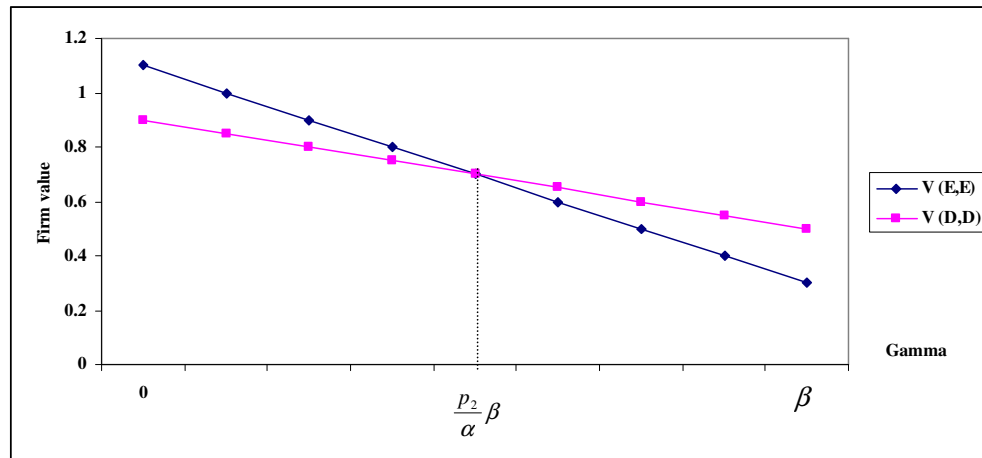


Figure 3.2 compares the firm values when both firms choose the all-equity (equilibrium) financial contracts, $V_i^*(E, E)$, with the firm values if they had selected long-term debt contract, $V_i(D, D)$, over the degrees of market power, $0 \leq \gamma \leq \beta$. When the degree of market power is at its maximum, $\gamma = 0$, the all-equity contract yields higher profits, than the long-term debt contract, $V_i(E, E) > V_i(D, D)$. At this low level of potential product market competition, wherein each firm has its local monopoly power, long-term debt has no strategic use. This is consistent with Fairchild (2004b) and Lyandres (2006), who showed that when the extent of competitive interaction among firms is low, a firm does not need debt for strategic purposes, in the absence of the other benefits of debt.

As their products become less differentiated, firms face more intense potential product market competition from one another. The firm value of selecting both financial contracts reduce, as firms engage more in the potential product market competition (their products become less differentiated). However, as shown in figure 3.2, firm values when the all-equity contract is selected, decrease much more than when the long-term debt contract is chosen. This is illustrated by the steeper line of $V(E, E)$. At the critical degree of market power, $\gamma_c = \frac{p_2}{\alpha} \beta$, both lines intersect, demonstrating that the firm values, when both firms select the all-equity contract, are equal to when the long-term debt contracts are selected. Beyond the critical degree of market power, $\frac{p_2}{\alpha} \beta \leq \gamma \leq \beta$, choosing the long-term debt contracts would yield higher firm values. Therefore, the firms now face a prisoner's dilemma. Even though the intensity of potential product competition causes firm value to fall, both firms could still be better off if they were leveraged beyond the critical degree of potential product competition.

Proposition 1 has proved Dasgupta and Titman's (1998) statement¹⁰ that '*with quantity competition, firms will be all-equity financed in the absence of other benefits associated with debt*' (page 714). Thus, the result of this first model of this thesis is consistent with their statement. It can also be compared with long-term debt in Fairchild's (2004b) Bertrand competition model. His model shows a non-monotonic relationship between debt and market power. Fairchild (2004b) argued that long-term debt has a strategic use at some levels of market power, where the limited liability effect of debt dominates the predation effect. In this non-spatial Cournot competition model, it shows that in equilibrium, firms do not strategically use debt at any degree of market power or product differentiation. One explanation for this, is that long-term debt causes the firm to become more short-termist, which is shown by the reduction in output (or conversely an increase in prices). Recall that shareholders of the leveraged firm are paid out of only date 1 profits. The date 2 profits are not relevant to them, because these are paid to debt holders. Therefore, the firm's manager, who acts in the shareholders' interest, decreases its output or increases its prices, to gain high short-term profits. Unfortunately, long-term debt in the non-spatial model does not have a strategic use as a commitment device to increase output, unlike short-term debt, which was suggested as a feasible mechanism by Brander and Lewis (1986). The limited liability effect of debt seems to be outweighed by the short-termist effect of long-term debt, in this Cournot model with differentiated products.

In addition, the model shows that the effect of market power plays an important role in determining the financial choice. Although the results show that firm value falls, as the levels of market power decreases, the leveraged firm's value is decreasing at a slower rate. Moreover, beyond the critical degree of market power, firms could be better off, if they both selected long-term debt. This naturally leads the model to consider the possibility of collusion in firms' financial decisions, in the next sub-section.

¹⁰ Dasgupta and Titman (1998) merely stated this without proof.

3.2.2 Cournot Competition with Collusion (Infinitely Repeated Game)

It is well established in the supergame literature that when firms interact over indefinite periods of time, then at least some degree of tacit collusion is rendered individually rational. Collusion in the output market occurs through output levels restrictions, and is supported by threats of reversion to the non-cooperative Cournot equilibrium. A firm will have an incentive to abide by the agreement, as long as the one period gains from defection are less than the expected payoffs the firm would be receiving in the punishment periods.

In the capital structure-product market relationship, the argument over whether debt facilitates tacit collusion remains inconclusive. On the one hand, there is an argument suggesting that debt induces a firm to deviate from the tacit collusion agreement. This argument has been led by Maksimovic (1988), who is one of the pioneering authors to explore the relationship between capital structure and the sustainability of collusion among firms. Based on Brander and Lewis's (1986) limited liability effect model, he showed that in an infinitely repeated duopoly game with stationary demand, debt commits a firm to increasing its output, thereby raising profits of the non-cooperative Cournot output. Therefore, debt raises the relative payoffs from defection, restricting the firms' ability to sustain tacit collusion. Maksimovic (1988) argued that debt encourages firms to deviate from the collusion agreement. Similarly, Stenbacka (1994) showed that debt reduces a firm's ability to sustain collusion in Bertrand competition. This is because debt increases the number of high demand states, in which a firm has an incentive to deviate from the collusive price agreement.

On the other hand, Damania (1997) argued that debt can be used as a device for facilitating tacit collusion in Cournot competition. His model can be viewed as an infinitely repeated version of Brander and Lewis's (1986) one-shot game model with stochastic demand uncertainty. Two firms choose their debt levels, prior to their output decisions and then given their debt levels they compete over their output levels, infinitely. Shareholders optimise their payoffs over non-bankrupt

states, whereas debt holders are the residual claimants in bankrupt states. Increases in debt induce firms to optimise over smaller non-bankrupt states. The neglect of the bankrupt states results in a rise in output levels in non-collusive periods. Damania (1997) showed that because of the limited liability effect of debt, shareholders ignore the low states of demand, in which debt holders optimise their payoffs. Such neglect leads to an increase in output in the Cournot-Nash equilibrium, and thereby reduces the payoffs from defecting. Debt makes defection less desirable, and therefore facilitates tacit collusion.

Recall the Cournot model with differentiated products in the previous sub-section, lemma 1 shows that long-term debt induces a firm to become more collusive in the product market, as shown by a reduction in output. The model argues that the output reduction is caused by the short-termist effect of long-term debt. Lemma 2 shows that firms select the all-equity contract in equilibrium, for every degree of market power. In proposition 1, the model demonstrates that when the degree of product differentiation (or market power) is beyond the critical value ($\gamma_c < \gamma$), the equilibrium is a prisoner's dilemma. Although the model shows that firms cannot prevent their firm values from falling, as the potential product market intensifies, firm values, when selecting the all-equity contract, decrease at a faster rate. Selecting the all-equity financial contracts commits them to produce much more than they should. Beyond the critical level of potential product market competition, firm values, when selecting the all-equity contract, are actually lower than when they select the long-term debt contract: $V_i(E, E) < V_i(D, D)$ at $\gamma_c < \gamma$. This suggests that both firms could be better off, if the long-term debt contract was selected at the degrees of market power beyond the critical level, γ_c .

This section extends the one-shot game non-spatial Cournot competition, by incorporating an infinitely repeated game. The non-spatial model will consider the possibility of collusion over the financial contract. Specifically, the model will consider how the exogenous degree of market power and firm myopia affect the sustainability of collusion over the financial contract.

In this section, the repeated game consists of infinite repetition of the one-shot game already analysed in section 3.2.1. That is, infinite repetition of the following:

Date 0: both firms make an implicit agreement to select the long-term debt contract.

Date 1: given their long-term debt contract, firms are bound with this collusive agreement to produce at $q_{i,j}(D, D)$.

Date 2: the model also assumes customer stickiness, which allows firms to charge their customers the expected reservation price, p_2 , in date 2. Profits are realised, and payoffs are distributed to debt holders.

Firms then move back to date 0 to re-select their financial contracts, and the game is repeated infinitely.

Recall the results in lemma 2 that, when $V_i(E, D) > V_i(D, D) > V_i(E, E)$, a firm will always have an incentive to renege on the agreement, by selecting the all-equity contract. The model employs the standard grim-trigger strategy. Both firms agree to issue long-term debt and maintain their output levels, until one of them deviates. If a firm reneges on the agreement, by selecting the all-equity contract in date 0, its rival will punish the firm by issuing all-equity in the very next period and the periods thereafter. The game is reverted to non-cooperative (non-collusive) Cournot-Nash equilibrium, like in the previous one-shot game model. The infinitely repeated game model maintains the assumption of the one-shot game, that firms are risk-neutral, and the market discount rate is zero. In addition, the model defines a firm's subjective discount rate as $r \geq 0$, which represents firm myopia, and this is not necessarily market-derived. For simplicity, the model assumes that both firms have the same subjective discount rate, r . That is, it is assumed that they have the same myopia, and they discount their future values at the same rate.

The output level, $q_{i,j}(D,D)$, can be sustained by the standard grim-trigger strategy, if short-run gains from deviating are not larger than discounted losses from the punishment phase.

That is, if $V_i(E,D) - V_i(D,D) \leq \frac{[V_i(D,D) - V_i(E,E)]}{r}$, then collusion is sustainable.

Lemma 4

Let the critical discount rate, $r_c = \frac{V_i(D,D) - V_i(E,E)}{V_i(E,D) - V_i(D,D)}$, such that

$r \leq r_c$, collusion is sustainable.

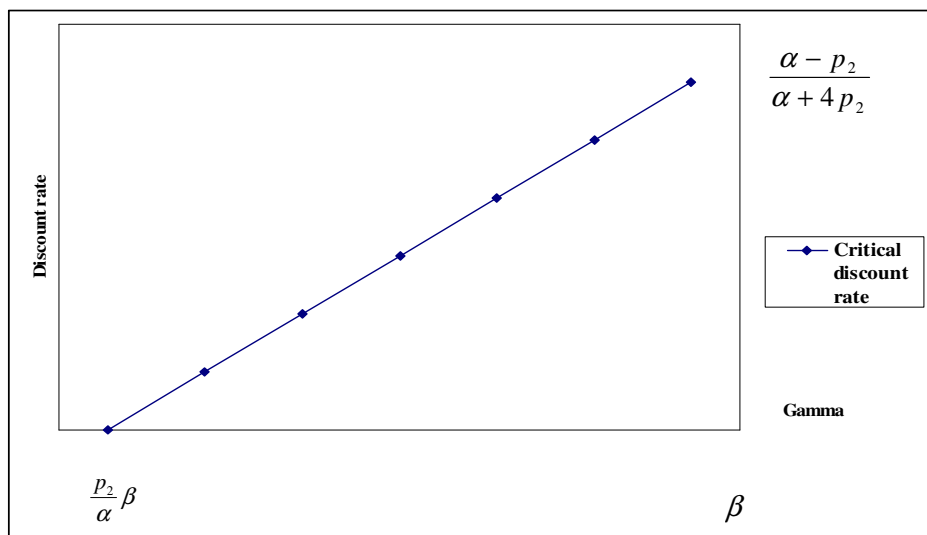
When the product competition is at its critical value, $\gamma = \gamma_c = \frac{p_2}{\alpha} \beta$, $r_c = 0$.

When the product competition is at its maximum, $\gamma = \beta$, $r_c = \frac{\alpha - p_2}{\alpha + 4p_2}$.

Proposition 2

Firms have incentives to sustain collusion, when the discount rate is below the critical discount rate, $r \leq r_c$. Figure 3.3 depicts the main analysis of the model, which is the relationship between the degrees of market power, firm myopia (represented by the discount rate), and sustainability of collusion. When the discount rate is below the critical discount rate, $r \leq r_c$, collusion is sustainable. In other words, collusion is sustainable in the region below the curve, and is not sustainable in the region above it.

Figure 3.3: The relationship between degrees of market power and the critical discount rates



As the degree of market power reduces (or equivalently, product differentiation decreases), the critical discount rate increases. It is more beneficial for both firms to collude, as the potential product market competition intensifies, as shown by the increase in the collusion region under the critical discount rate line. Although the potential product market competition reduces the payoffs from defecting, $V_i(E, E)$, as well as the payoffs from colluding, $V_i(D, D)$, the latter declines less than the former. This makes collusion more attractive and beneficial to both rivals.

The findings of the non-spatial model show that debt encourages collusive behaviour, when product market competition is intense. The model contributes to the theoretical work of Maksimovic (1988), Stenbacka (1994), and Damania (1997) who examined capital structure and collusion in the product market. In particular, the model is consistent with Damania (1997), who showed that debt can facilitate collusive behaviour. However, the interpretation is somewhat different, in the sense that debt in Damania (1997) makes defection become less attractive, thereby promoting collusion in output, whereas in the model in this

section firms' collusion, in selecting the long-term debt contract, restricts the level of output in the product market. Although the non-spatial model does not examine the role of lenders, one might observe that firms' incentives to collude in capital structure, with no intention of deviation, can be made credible, if both firms borrow from a common lender. This is consistent with the research that suggests collusive behaviour in the product market can be transferred from collusion or concentration in the capital market.

3.3 Spatial Model

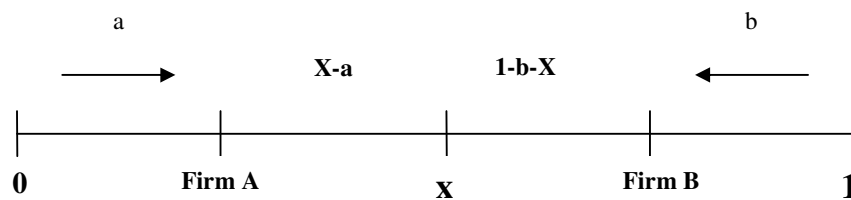
3.3.1 Linear Transportation costs

Thus far, this chapter has focused on the relationship between capital structure and product market within a framework of the non-spatial model. This section changes the approach and considers the relationship by using a framework of a spatial model. The advantage of the spatial model is that it allows for analysis of the interaction between customer preferences and the firm's product market behaviour and debt choices. Customer preferences are represented by the transportation costs, both types (linear and quadratic) and level (t). Because this section adopts a spatial approach, it is more natural to consider Bertrand price competition than Cournot quantity competition.

Suppose there are two firms, $i \in \{A, B\}$, selling products that are identical in all respects, except for one characteristic, which is the location where they are sold. Firms must locate somewhere in the unit interval, 0-1. The location of the firm can be considered as how much its product is differentiated from its rival's. Recall the example of the T-shirt producers in the non-spatial model. If firm A is the white T-shirt producer and firm B is the black T-shirt producer, then they would want to locate their shops as far away from each other as possible. Firm A would want to locate at point 0, whereas firm B would want to locate at point 1. As their products become less differentiated, that is to say, as the white T-shirt is darkened and black T-shirt is lightened, firms would want to locate closer to each other by

moving towards the centre of the line. In the standard location model with linear transportation costs, it is shown that if both firms are located too closely, they start undercutting each other's prices, resulting in a process of price cuts that does not converge to equilibrium. Firms would be better off, if they did not locate close to each other. (Shy, 1995).

For simplicity, the model assumes that firm A is located at point a units of distance from 0, whereas firm B is located at point b units of distance from 1, with $a = b$. In other words, the firms are symmetrically located, as illustrated below. In sum, the firms' locations are assumed to be exogenously given.



The attention now moves to the demand side of the market, that is the customers. Suppose that there is a continuum of customers locating uniformly across the unit interval. Let X denote the marginal customer, who is indifferent to buying from firm A or firm B . Customers, who are located to the left of consumer X , strictly prefer to buy from firm A , whereas all customers located to the right, strictly prefer to buy from firm B . These customers must travel to a firm to buy its product, and for them, this incurs some travelling costs. Therefore, each customer's utility from buying one unit of product can be expressed as his reservation utility, U , minus the price of unit, t , times the distance travelled. For example, the customer X has to pay the transportation cost of $t(X-a)$ for buying a product from firm A or $t(1-b-X)$ for buying it from firm B .

The interpretation of the transportation cost per unit, in this spatial model, draws on a statement made by Hotelling (1929) and cited in Shy (1995):

'These particular merchants would do well, instead of organising improvement clubs and booster associations to better the roads, to make transportation as difficult as possible'. (page 151)

The spatial model uses the above statement to put forward the proposition that a firm has high market power, when a customer has to pay more transportation costs to buy its product. Thus, the degree of market power is represented by the transportation cost per unit, in this non-spatial model. The higher the transportation cost per unit, t , the higher the market power for a firm. One might observe some similarity between the notion of market power in the non-spatial and the spatial models. In the former, a firm has more market power when its product is least substitutable with its rival's product. In the latter, the more the product is *perceived* to be different by customers, the higher market power the firm has. Product differentiation in the non-spatial model comes from the supply side of the market, that is to say, from the firms, whereas in the spatial model, product differentiation comes from the demand side of the market, namely the customers. Thus, one may also view a firm with a high transportation cost per unit, as a firm engaged in less intense potential product market competition, owing to its high product differentiation.

The objective of the spatial model is to examine how the exogenous degree of market power determines the level of long-term debt, and how the firms' financial structures affect their pricing strategy given their fixed location. The timeline of the game is the same as for the non-spatial model. Firms simultaneously make their financial decisions, prior to the competition and they then compete in prices over two periods of product market competition. Once again, the model assumes 'customer stickiness'. When deciding upon their date 1 price levels, each firm faces the following trade-off: short-term high profit and long-term customer base. If they charge high prices in date 1, they will earn high date 1 profits, at the

expense of their low date 2 market share and low date 2 profits. This implies that, apart from the potential product competition, another force that may drive the price level down is the firm's desire for a large long-term market share. The difference in the spatial model is that the date 2 reservation prices are assumed to be unknown. The timeline of the spatial model is as follows:

Date 0: firms simultaneously select long-term debt levels, d_A and d_B , to maximise their expected total firm values.

The rivals compete over two periods, date 1 and date 2.

Date 1: given its own and the rival's date 0 financial structure, the firms simultaneously set their levels of prices to maximise expected return to shareholders.

Because in date 1 debt has already been lent to each firm, its manager, whose goal is to maximise its shareholders' value (assume that there is no principal-agent problem), will no longer have an incentive to consider the fortunes of debt holders, when choosing date 1 prices. That is, the firm ignores the states, in which debt holders optimise their payoffs.

Date 2: given customer stickiness, firms charge their customers at the reservation price, which is assumed to be unknown in date 0 and date 1, but is then resolved in date 2.

The unknown reservation price represents the product market uncertainty in the spatial model. The operating profits are earned, and debt holders are paid their payoffs.

For simplicity, the model assumes that both firms charge the same reservation price, Pr , and this is drawn from a uniform distribution, $Pr \sim U(0, R)$. Given that the probability density function is $f(Pr) = \frac{1}{R}$, the date 0 expectation of the reservation value is therefore given by;

$$\begin{aligned} E(Pr) &= \int_0^R \frac{Pr}{R} dPr, \\ &= \frac{1}{R} \left[\frac{Pr^2}{2} \right]_0^R, \\ &= \frac{R}{2}. \end{aligned}$$

The model assumes that the firms are risk-neutral and the risk-free rate is zero. The product costs are normalised to zero. Let V_i denote the date 0 expected firm values of firm A and firm B , where $i = A$ and B , such that:

$$(1a) V_A = (p_A + E(Pr))X_A$$

$$= p_A X_A + \frac{R}{2} X_A,$$

$$(1b) V_B = (p_B + E(Pr))X_B$$

$$= p_B X_B + \frac{R}{2} X_B,$$

where p_A and p_B are the respective date 1 price of firm A and B ,

X_A and X_B are the firm A and B demand levels, respectively,

$\frac{R}{2}$ is the expected date 2 reservation price.

If firm A and firm B choose respective date 0 debt levels d_A and d_B , then the low demand states in date 2 become irrelevant to their shareholders. Equity values are expressed as;

$$(2a) \Pi_A = p_A X_A + X_A \int_{d_A}^R \frac{\Pr}{R} d \Pr$$

$$= p_A X_A + X_A \left[\frac{R^2 - d_A^2}{2R} \right]$$

$$(2b) \Pi_B = p_B X_B + X_B \int_{d_B}^R \frac{\Pr}{R} d \Pr$$

$$= p_B X_B + X_B \left[\frac{R^2 - d_B^2}{2R} \right]$$

Recall consumer X 's utility functions from buying from firm A or firm B can be mathematically expressed as:

$$U_A = U - p_A - t(X - a),$$

$$U_B = U - p_B - t(1 - b - X).$$

Since consumer X is indifferent to buying from firm A or firm B , each firm's demand function is derived by equating consumer X 's utilities; $U_A = U_B$.

Therefore, the demand functions of firm A and firm B are:

$$(3a) X_A = \frac{p_B - p_A}{2t} + \frac{1}{2},$$

$$(3b) X_B = 1 - X_A.$$

$$= \frac{p_A - p_B}{2t} + \frac{1}{2}$$

The game is solved by backward induction.

Solving for date 1 equilibrium prices given debt levels

Date 1 equilibrium prices are solved by taking date 0 debt levels, d_A and d_B , as given. Firms simultaneously choose their date 1 prices to maximise their equity values, (2a) and (2b), given their expectation of their rival's pricing decision. The demand functions, (3a) and (3b), are substituted into the expected equity value equations, (2a) and (2b). The equilibrium prices p_A^* and p_B^* are then obtained by solving for the first-order conditions, $\partial \Pi_A / \partial p_A = 0$, and $\partial \Pi_B / \partial p_B = 0$, respectively.

Lemma 1 The date 1 equilibrium prices are:

$$p_A^* = t - \frac{R}{2} + \frac{d_B^2 + 2d_A^2}{6R}.$$

$$p_B^* = t - \frac{R}{2} + \frac{d_A^2 + 2d_B^2}{6R}.$$

The result in lemma 1 shows that increasing debt raises the level of the firms' prices and this suggests that debt softens the price competition. This finding supports the theoretical argument of Showalter (1995) and Fairchild (2004b), that the limited liability effect of debt induces more collusive behaviour in Bertrand competition. Moreover, lemma 1 shows that it is not only the firm's own long-term debt that has an effect on its prices, but also its rival's long-term debt has an impact on the firm's prices. However, the softening effect of the firm's long-term debt has a more pronounced effect than the rival's long-term debt.

Solving for date 0 equilibrium debt levels

The date 1 equilibrium prices, p_A^* and p_B^* , from lemma 1, and the demand functions, (3a) and (3b), are substituted into the firm value functions, (1a) and (2b). The equilibrium debt levels are then solved by $\partial V_A / \partial d_A = 0$, and $\partial V_B / \partial d_B = 0$.

The model obtains the following.

Proposition 1

The date 0 equilibrium debt levels are $d_A^* = d_B^* = \sqrt{2Rt}$.

Given the date 0 equilibrium debt level, the date 1 equilibrium prices from lemma

1 can be expressed as $p_A^* = p_B^* = 2t - \frac{R}{2}$.

The equilibrium date 0 firm values are $V_A^* = V_B^* = t$.

Recall that the transportation cost per unit represents the degree of market power. The higher the degree of market power, the less intense is the potential product market competition. Proposition 1 suggests that the date 0 equilibrium debt level is increasing monotonically with market power. This can also be inversely interpreted as that the equilibrium debt level is decreasing with the potential product market competition or the level of transportation cost, t . Although lemma 1 shows that the limited liability effect of long-term debt induces collusive behaviour in the actual product market competition, proposition 1 shows that the predation effect dominates the use of long-term debt in the equilibrium. Firms reduce their debt levels, as potential product market competition increases. Proposition 1 also shows that the equilibrium prices and the equilibrium firm values are unambiguously increasing with the degrees of market power (decreasing with the potential product market competition).

3.3.2 Quadratic Transportation Costs

The model maintains the same timeline and the assumptions used above in the case of linear transportation cost.

Customer X 's utility functions from buying from firm A or firm B are now expressed as:

$$U_A = U - P_A - t(X - a)^2,$$
$$U_B = U - P_B - t(1 - b - X)^2$$

Since the marginal consumer X is indifferent to buying from firm A or firm B , the demand functions are derived by equating consumer X 's utility functions; $U_A = U_B$.

Therefore, the demand functions of firm A and firm B are:

$$(4a) X_A = \frac{P_B - P_A}{2t(1 - a - b)} + \frac{1}{2},$$

$$(4b) X_B = \frac{P_A - P_B}{2t(1 - a - b)} + \frac{1}{2}.$$

The game is solved by using exactly the same process as before, that is to say by using backward induction to derive the equilibrium date 0 debt levels and date 1 equilibrium prices. Note that firms set their date 0 debt levels to maximise firm value, whilst they set their date 1 prices to maximise equity value, given their expectation of their rivals' debt and pricing decisions.

Solving for date 1 equilibrium prices, given debt levels

The demand functions, (4a) and (4b), are substituted into the expected equity value equations, (2a) and (2b). The equilibrium prices p_A^* and p_B^* are then obtained by solving $\partial \Pi_A / \partial p_A = 0$, and $\partial \Pi_B / \partial p_B = 0$, respectively.

Lemma 2 The date 1 equilibrium prices are:

$$p_A^* = t(1 - a - b) - \frac{R}{2} + \frac{d_B^2 + 2d_A^2}{6R},$$
$$p_B^* = t(1 - a - b) - \frac{R}{2} + \frac{d_A^2 + 2d_B^2}{6R}.$$

The results in lemma 2 offer similar suggestions to those in lemma 1: increasing debt softens the actual price competition.

Solving for date 0 equilibrium debt levels

The date 1 equilibrium prices, p_A^* and p_B^* , from lemma 2, and the demand functions, (4a) and (4b), are substituted into the firm value functions, (1a) and (2b). The equilibrium debt levels are then solved by $\partial V_A / \partial d_A = 0$, and $\partial V_B / \partial d_B = 0$.

The model obtains the following.

Proposition 2

The date 0 equilibrium debt levels are $d_A^* = d_B^* = \sqrt{2Rt(1 - a - b)}$.

Given the date 0 equilibrium debt level, the date 1 equilibrium prices from lemma

2 can be expressed as $P_A^* = P_B^* = 2t(1 - a - b) - \frac{R}{2}$.

The equilibrium date 0 firm values are $V_A^* = V_B^* = t(1 - a - b)$.

Proposition 2 shows that the results obtained in the quadratic transportation cost are similar to those in the case of the linear transportation cost. The date 0 equilibrium debt levels, the date 1 equilibrium prices, and firm values are unambiguously increasing in market power, which is represented by the transportation cost per unit. However, one can observe a difference in the results of the quadratic transportation case, which is the effect of firm location on the equilibrium debt, prices, and firm value. Proposition 2 demonstrates that the equilibrium prices and firm value, do not only depend on transportation cost per unit (or market power), but also on firm location. When each firm locates furthest away from each other, that is firm *A* locates at *a* and firm *B* locates at *b*, where $a = b = 0$, the equilibrium prices and firm values are equal to those of the linear transportation cost case. Proposition 2 also demonstrates that as firms locate closer to one another, $a = b < 1$, their prices and firm values decrease, *ceteris paribus*.

The equilibrium prices and firm values are not only affected by the degree of market power, *t*, but they are also affected by where firms are located. A comparison of firm values and equilibrium prices, in the two transportation cost cases, shows that although firm values and prices unambiguously increase in market power in both cases, firm location has a dampening effect on the increase in firm values and prices, in the case of the quadratic transportation cost. Moreover, product differentiation from the supply side of the market (firm location) affects prices and firm values in the quadratic transportation cost case.

The following diagram is used to illustrate the argument of the effect of firm location on the date 0 equilibrium debt and its comparison with the case of linear transportation cost.

Figure 3.4: The Effect of Transportation Costs on Debt

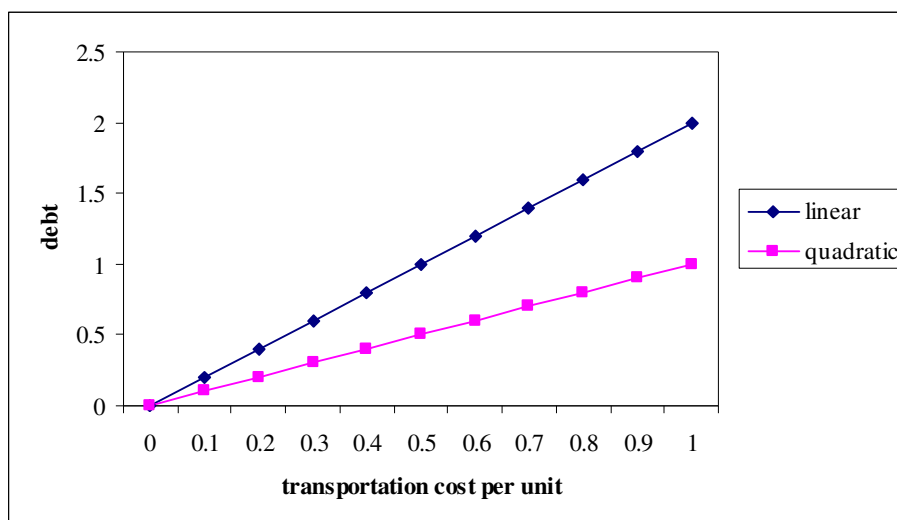


Figure 3.4 compares the rate of an increase of long-term debt for the two transportation cost cases. The steeper line represents the effect of transportation cost on debt in the linear case, whereas the flatter line represents the effect of transportation cost on debt in the quadratic case. As demonstrated in propositions 1 and 2, long-term debt is increasing with market power (the transportation cost per unit), in both cases. Alternatively, this can be interpreted as long-term debt is decreasing with potential product market competition, t . A decrease in long-term debt is caused by the predation effect. Because of the higher effect of potential product competition when firms locate closer to each other, firms in the quadratic transportation cost case decrease long-term debt more sharply than firms in the case of linear transportation cost. A firm decreases its debt excessively, in order to avoid the predation threat from its rival, as a result of more intense potential product market competition from the supply side of the market (firms are located closer to one another) and from the demand side of the market (a decrease in the level of the transportation cost per unit). This is consistent with Dasgupta and Titman's (1998) suggestion that when competition becomes more intense or when demand is elastic (decreasing in the transportation cost per unit), a firm should have less debt.

3.3.3 Vertically Differentiated

Finally, the chapter examines a case of vertical differentiation, in which firms invest in product enhancement. This case allows for a consideration of a further factor in the financial contract and product market competition relationship, that is, the effect on investment of product enhancement.

Firm A and firm B are exogenously located, as before. That is, the model still assumes that their products are not highly differentiated, and that gives them some potential product market competition. However, each firm can choose to invest an amount $C_i \in \{0, c_i\}$ to enhance the quality features of their products and enhancement in product quality reflects firms being vertically differentiated. Noticeably, vertical differentiation can occur only when one of the firms invests in product enhancement. The model assumes the same timeline as before, but with an additional date -1, in which firms, simultaneously, decide whether to invest in product enhancement. Each firm makes this decision to maximise its firm value, given its expectation of its rival's investment choice.

The marginal consumer X 's utility from buying from firm A or from B are:

$$\begin{aligned} U_A &= U + \Delta_A - P_A - t(X - a), \\ U_B &= U + \Delta_B - P_B - t(1 - b - X), \end{aligned}$$

where Δ_i represents the consumer's enhanced utility from buying from firm i . When $C_i = 0$, $\Delta_i = 0$, and when $C_i = c_i$, $\Delta_i = \delta_i$.

The demand functions of firm A and firm B are obtained by equating the utility functions, $U_A = U_B$.

The demand functions when both firms invest are:

$$(5a) X_A = \frac{P_B - P_A + \Delta_A - \Delta_B}{2t} + \frac{1}{2},$$

$$(5b) X_B = \frac{P_A - P_B + \Delta_B - \Delta_A}{2t} + \frac{1}{2}.$$

The game is once again solved by backward induction.

Solving for date 1 equilibrium prices given debt levels

Both firms choose date 1 prices to maximise the equity values, (2a) and (2b) and the demand functions, (5a) and (5b) are substituted into the equity values, (2a) and (2b). The equilibrium prices are then obtained by solving $\partial \Pi_A / \partial P_A = 0$ and $\partial \Pi_B / \partial P_B = 0$.

Lemma 3

The equilibrium date 1 prices when both invest in product-enhancement are:

$$P_A^* = t - \frac{R}{2} + \frac{d_B^2 + 2d_A^2}{6R} + \frac{\Delta_A - \Delta_B}{3}.$$

$$P_B^* = t - \frac{R}{2} + \frac{d_A^2 + 2d_B^2}{6R} + \frac{\Delta_B - \Delta_A}{3}.$$

Lemma 3 shows that an increase in debt leads to a higher price level. The results are consistent with the horizontal differentiation cases and with most previous work that has posited that debt softens prices in Bertrand competition (for example, Showalter, 1995; and Fairchild, 2004b).

Solving for date 0 equilibrium debt levels

The rivals choose debt to maximise the firm values, (1a) and (1b), given the date -1 utility enhancing investment, C_i . The date 1 equilibrium prices from lemma 3 are substituted into the demand functions, (5a) and (5b), and into the firm

value functions, (1a) and (1b). Then $\partial V_A / \partial d_A = 0$, and $\partial V_B / \partial d_B = 0$ are solved to obtain the equilibrium debt levels, given the date -1 utility enhancing investment.

Lemma 4

- a) If both firms invest in utility enhancement ($C_A = C_B = c$), or neither firm invests in utility enhancement ($C_A = C_B = 0$), the equilibrium debt levels are $d_A^* = d_B^* = \sqrt{2Rt}$.
- b) If only firm A invests in utility enhancement ($C_A = c, C_B = 0$), the equilibrium debt levels are $d_A^* = \sqrt{2Rt + \frac{2}{5}\delta R}$, and $d_B^* = \sqrt{2Rt - \frac{2}{5}\delta R}$.

Lemma 4 a) shows that when both firms make an identical decision, either investing in utility enhancement or not investing, the equilibrium debt is the same as in the horizontal differentiation case. Debt is increasing with the degree of market power. Only when one of them invests in product enhancement, are their debt levels asymmetric and the firm that invests in product enhancement is more leveraged than the one that does not.

Solving for the date -1 investment decision

Each firm makes its investment decision to maximise its total firm value, given its expectation of the other firm's investment decision. The date 0 equilibrium debt levels from lemma 4 are substituted into the equilibrium prices from lemma 3, and the equilibrium prices are then substituted into the demand functions, (5a) and (5b). Finally, the equilibrium quantities and prices are substituted into the firm values, (1a) and (1b) and the following are obtained.

If both firms invest in product-enhancement at date -1, the firm values are given by:

$$(6a) V_A = V_B = t - c.$$

If neither firm invests, the firm values are given by:

$$(6b) V_A = V_B = t.$$

If only firm A invests, then:

$$(6c) V_A = t + \frac{\delta^2}{25t} + \frac{2\delta}{5} - c,$$

$$(6d) V_B = t + \frac{\delta^2}{25t} - \frac{2\delta}{5}.$$

Using equations (6a) – (6d), the Nash equilibria of the product enhancement game are derived as follows:

Proposition 3

a) If $c \leq \frac{2\delta}{5} - \frac{\delta^2}{25t}$, both firms invest in utility enhancement ($C_A = C_B = c$).

The equilibrium debt levels are $d_A^* = d_B^* = \sqrt{2Rt}$.

The equilibrium firm values are $V_A = V_B = t - c$.

b) If $\frac{2\delta}{5} - \frac{\delta^2}{25t} < c \leq \frac{2\delta}{5} + \frac{\delta^2}{25t}$, only one firm invests in utility enhancement

($C_A = c, C_B = 0$).

The equilibrium debt levels are $d_A^* = \sqrt{2Rt + \frac{2}{5}\delta R}$, and $d_B^* = \sqrt{2Rt - \frac{2}{5}\delta R}$.

The equilibrium firm values are $V_A = t + \frac{\delta^2}{25t} + \frac{2\delta}{5} - c$, and $V_B = t + \frac{\delta^2}{25t} - \frac{2\delta}{5}$.

c) If $\frac{2\delta}{5} - \frac{\delta^2}{25t} < \frac{2\delta}{5} + \frac{\delta^2}{25t} < c$, neither firm invests in utility enhancement.

The equilibrium debt levels are $d_A^* = d_B^* = \sqrt{2Rt}$.

The equilibrium firm values are $V_A = V_B = t$.

The equilibrium of this vertically differentiated game is affected by the product enhancement investment costs. When investment costs are very low (proposition 3a) or very high (proposition 3c), the rivals make the same investment decision, and the debt level is identical and symmetric in both cases. Note that the equilibrium in the proposition 3a represents a prisoner's dilemma. Both firms would prefer it if neither invests in product enhancement, as they would then achieve $V_A = V_B = t$. However, neither can commit not to invest, so they both invest, and $V_A = V_B = t - c$. When investment costs are at a medium level (proposition 3b), only one firm invests, with asymmetric equilibrium debt levels. The firm that invests in quality is able to set a higher debt level, than the firm that does not invest. The intuition is that, by investing in quality, the firm attracts more customers, and is able to charge a higher price. Therefore, this firm can set a higher debt level to further soften price competition, without fear of predation.

The implication of the vertically differentiated model is somewhat different from the implication of the stakeholder theory of capital structure. Recall that under the non-financial stakeholders' perception argument, Maksimovic and Titman (1991) argued that a firm with the need to maintain its reputation for being a high quality producer may be expected to be less indebted. This is because customers cannot distinguish the product until after consumption and therefore, they may be reluctant to buy products from a highly leveraged firm. On the contrary, the vertically differentiated model shows that a firm, whose high quality product is a result of its enhancement investment, can strategically obtain more debt to increase its price level. The vertically differentiated model can also be compared with Ross's (1997) signalling model, in which a high ability manager uses debt to separate himself from a low ability manager and to signal the quality of the company to the capital market. In the vertically differentiated model, product

enhancement differentiates the type of firms, which allows the high quality firm to further gain strategic advantage in the product market.

Moreover, one can note that the results of other models in this chapter suggest symmetric decisions and equilibriums. In the vertically differentiated model, there is a possibility of obtaining asymmetric equilibrium.

3.4 Conclusion

The chapter has developed theoretical models to analyse the impacts of the degree of market power, which is represented by product differentiation, on long-term debt, and how firms' financial structures affect their competitive strategies in actual product market competition. With this goal, two differentiated products models have been considered. In the non-spatial model, the exogenous degree of market power is represented by the degree of product differentiation, and by the transportation cost per unit in the spatial model with product market competition. Both models support prior studies that have stated that long-term debt induces firms to be less competitive: reducing output levels in the non-spatial Cournot model, and increasing price levels in the spatial model.

Initially, a non-spatial Cournot one-shot game model was introduced to show that the effects of market power or product differentiation outweigh the strategic benefit of debt. For every degree of market power, both firms simultaneously choose the all-equity financial contracts in equilibrium. Subsequently, the model has shown that for certain degrees of market power the all-equity financial equilibrium is a prisoner's dilemma. The model was then extended to an infinitely repeated game to examine the relationship between the degrees of market power, firm myopia (represented by the critical discount rate), and the sustainability of collusion. In general, it is more beneficial for firms to collude as the degree of market power reduces. The sustainability of collusion depends on the critical discount rate which is decreasing with market power.

In the spatial model, firms are assumed to be located not far from each other. The exogenously given locations imply that firms face some potential product market competition from one another. The model has shown that long-term debt facilitates collusive behaviour in the product market and in addition, that the debt level is determined by market power. In both the linear and quadratic transportation cost cases, long-term debt is increasing with market power, measured by the transportation cost per unit. However, long-term debt in the latter case does not excessively increase, as in the former. The model has demonstrated that the predation effect dominates the use of long-term debt, in both the linear and quadratic transportation cost cases. For the vertical differentiation case, firms have a choice of whether to invest in product quality enhancement, prior to the financial decision. The model has shown that a firm that invests in product enhancement is able to obtain more debt and soften the actual price competition further, without fear of predation.

Finally, this researcher notes that all of the models in the chapter have demonstrated that the type of competition in the product market (spatial versus non-spatial; Cournot competition versus Bertrand competition) affects the relationship between market power, represented by product differentiation, and long-term debt. Following Fairchild (2004b), who expounded that there is a non-monotonic relationship under Bertrand competition, this chapter's analysis has revealed that, under non-spatial Cournot competition, the equilibrium level is zero debt (all-equity), for any degree of market power or product differentiation. In the case of the spatial model, the relationship between market power or product differentiation and debt is positive. Alternatively, it can be interpreted that the relationship between potential product market competition and debt is negative, owing to the dominance of the predation effect. It is therefore worth testing this relationship empirically and this is the subject of the next chapter.

Chapter 4

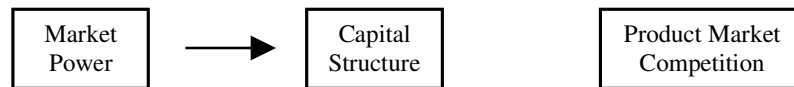
Empirical Study

In chapter 3, theoretical models were developed to demonstrate that the relationship between market power/product differentiation and long-term debt is complex and may be linearly positive, negative, or non-monotonic, depending on the type of competition, i.e. spatial or non-spatial, Bertrand or Cournot competition. In this chapter, an empirical examination of this relationship is carried out. As existing research has focused on developed countries, a major contribution of this thesis is to study the relationship in the Southeast Asian tiger economy countries of: Indonesia, Malaysia, the Philippines, and Thailand. This work can therefore be considered as complementing Pandey's (2004) analysis of capital structure and market power in Malaysia.

Prior empirical research in capital structure has shown that a firm's choice of debt depends on some firm-characteristic factors, which are theoretically based on: the trade-off model, the agency costs framework, and the pecking order/asymmetric information theory. Most early empirical evidence in the field has mainly been derived from data from the U.S. (for example, Bradley et al., 1984; Titman and Wessels, 1988; and Barclay et al., 1995). From the mid 1990s, a series of empirical evidence of other, single, developed countries and international studies started to emerge, including, for example: Rajan and Zingales's (1995) study of G-7 countries, the international comparison of Wald (1999), and Bevan and Danbolt's (2002) empirical study, carried out in the U.K.. In general, empirical evidence of developing countries has just begun to appear over the last decade (Demirguc-Kunt and Maksimovic, 1999; Pandey, 2001; and Booth et al., 2001). As this work is still considered to be at an early stage of development, it provides some promising avenues for exploration.

The theoretical models in the previous chapter (chapter 3) showed that a firm's financial decision can be influenced by its characteristics in the product market, represented by the exogenous degree of market power/product differentiation.

Given the levels of market power, the firm's chosen financial selection, in turn, affects its real decision, as well as its rival's decision in the product market. In this chapter, this interrelation will be empirically examined. This study, however, is not able to empirically examine the effect of capital structure on the firm's decision in the *actual* product market competition, such as prices or output decision, owing to the lack of pricing and quantity data. Nevertheless, the empirical evidence of such a relationship has already been studied in much existing work. For example: Chevalier (1995b) studied the effect of debt on the pricing decision in the supermarket industry; Phillips (1995) examined the output decision following recapitalisation; and Grullon et al. (2002) investigated the effect of leverage on advertising competition. Given the considerable amount of existing empirical evidence of the capital structure and *actual* product market competition relationship, this study empirically examines the potential effects of market power on capital structure. That is to say, it only focuses on the first part of the interrelationship, as set out below.



Even with such limitations, this researcher strongly believes that this study is contributing to the ongoing research into capital structure and the product market, which appears to be somewhat lacking, when it comes to evidence of the effects of market power on capital structure.

Although the theoretical models developed in the previous chapter mainly examined the potential effect of market power on *long-term debt*, the empirical study in this chapter will also investigate any impact market power may have on *total* and *short-term debt*. This is in order to address the importance of recognising variations in the effect a determinant may have on different attributes of debt. In order to do so, the study utilises firm-level data for four developing countries in the Southeast Asian region, namely: Indonesia, Malaysia, the Philippines, and

Thailand.¹¹ The selection of the sample countries is based on an observation that there is still a lack of evidence regarding countries from this region. Moreover, this researcher hopes to contribute to the ongoing debate on whether the firm-specific factors, that are well known to influence capital structure in developed countries, can also be applied to capital structure decisions in developing countries.

The empirical work in this chapter is divided into two studies: the static model and the dynamic panel model. In the static model, the linear effect of market power and other firm-specific determinants of capital structure are investigated. The static model also considers the possibility of a non-linear relationship between market power and debt, as empirically demonstrated by Pandey (2004) and theoretically developed in Fairchild (2004b). In addition, it investigates the industry effect on leverage. The dynamic panel model examines speeds of adjustment of three types of debt. In order to carry out these empirical investigations, the statistical software package, STATA (version 9) is used for investigating the static model, whereas the dynamic panel model employs EViews (version 6.0).

The chapter is organised as follows. The theoretical framework, given in section 4.1, briefly reviews proxies of capital structure as used in previous empirical studies. This also includes a short discussion on market power and a review of the firm-specific determinants of capital structure, their proxies, and their expected relationships with debt. The chapter then proceeds to describe variables and estimation methods employed in the study in section 4.2, followed by a presentation of the results and analysis in section 4.3. To conclude, section 4.4 briefly summarises the chapter.

¹¹ An earlier version of this empirical study used only Thailand as the case study. The paper was co-authored with Dr. R. Fairchild, and Prof. R. Rathinasamy. It was accepted and presented at the European Applied Business Research (EABR) Conference organised by the Clute Institute of Academic Research in June 2007.

4.1 Theoretical Framework

4.1.1 Measures of Leverage

One obstacle that a researcher may have to encounter in an empirical study, is selecting a proxy for each variable that is included in the investigation. There are some appropriate and widely-used proxies for capital structure. Rajan and Zingales (1995) suggested that the choice of proxy depends on the objective of each particular study. For example, the debt-to value ratio is possibly more appropriate for the agency-related problem, because it concerns how a firm has been financed in the past. A proxy like ‘interest coverage’ is probably more appropriate in studies concerning transferring control, when firms are financially distressed.

Rajan and Zingales (1995) identified strengths and weaknesses of some proxies. For instance, the ratio of ‘total liabilities-to-total assets’ simply suggests what is left to a firm’s shareholders in the case of liquidation and the proxy does not indicate whether the firm is at risk of default in the near future. This ratio may overstate the amount of leverage, because it includes non-financial items, such as accounts payable. To counter this problem, an alternative measure, which excludes accounts payable, such as ‘total debt-to-total assets’, might be more appropriate. This proxy is one of the most commonly used, especially in empirical studies using data from developing countries, because, as suggested by Pandey (2004), in many developing countries firms use both short-term and long-term debt to finance their assets. It is also common for firms in these countries to substitute short-term for long-term debt, and roll over short-term debt. Therefore, it is more appropriate to use total debt, especially in studies of developing countries. However, Titman and Wessels (1988) argued that debt should not be combined as total amount of debt, because different types of debt have different implications. For example in their study, asset collateral (tangibility) is positively related to long-term debt, whereas it is negatively related to short-term debt. Furthermore, total assets can be affected by non-debt liabilities, such as the

amount of gross trade credit. In order to avoid this gross trade credit effect, some studies have replaced total assets with net assets, where the latter is defined as total assets less accounts payable and other liabilities. Net assets, themselves, can be influenced by assets held against pension liabilities (Rajan and Zingales, 1995). Alternative measures of leverage used in capital structure studies include: 'long-term debt to book value of debt plus market equity' (Bradley et al., 1984), 'average total debt obligations over the relevant time range to average total asset' (Showalter, 1999), and 'total debt-to-capitalisation' (Rajan and Zingales, 1995).

Another issue often mentioned in empirical studies of capital structure, is the question of using the book value or market value of debt to obtain the most accurate measure of leverage. As many studies may have encountered, the problem of using market value of debt, as a proxy, lies with the insufficiency of data. To alleviate this problem, some studies have alternatively used market leverage, defined as the ratio of book value of total debt to total liabilities and market value of equity. Based on Bowman's (1980) findings of high cross-sectional correlation between market value and book value, Titman and Wessels (1988) argued that the problem of misspecification of using book value measures is trivial. Moreover, the differences between market and book value of debt should not be correlated with other determinants of capital structure, thus, using the book value of debt will not give unbiased results. A justification of using book value of debt has also been presented by Song and Philippatos (2003), who argued that the main cost of borrowing is the expected cost of financial distress in the event of bankruptcy. This financial distress affects the weighted average cost of capital and optimal capital structure and in such a situation, the value of the distressed firm is closer to its book value. Once debt has been issued, changes in the market value of debt do not have any effect on the tax-shield effects of debt. Furthermore, managers often set their level of leverage, in terms of a randomly selected target ratio, measured at book value (Song and Philippatos, 2003).

In sum, each proxy has its own advantages as well as limitations. Therefore, one should bear in mind any linked caveat when selecting the proxy, and particularly

when analysing the results. Nevertheless, sometimes it can be argued that the choice of the proxy does not depend on the objective of the study, but instead it depends on the availability of the data.

4.1.2 Market Power

The term ‘market power’ has long appeared in the study of the relationship between market structure and returns to shareholders. ‘Market power’ is frequently used as an operational term for market structure (Sullivan, 1974 and 1977). High seller concentration, high market share, and entry barriers are often associated with high market power. Studies of capital structure and product market structure, such as Krishnaswamy et al. (1992) and Rathinasamy et al. (2000), have suggested that market structure can be expressed in terms of a firm’s control over its price or quantity, which is also known, in operational terms, as: monopoly, oligopoly, or perfect competition. A monopoly firm has more control over its product market strategy, than a firm in perfect competition.

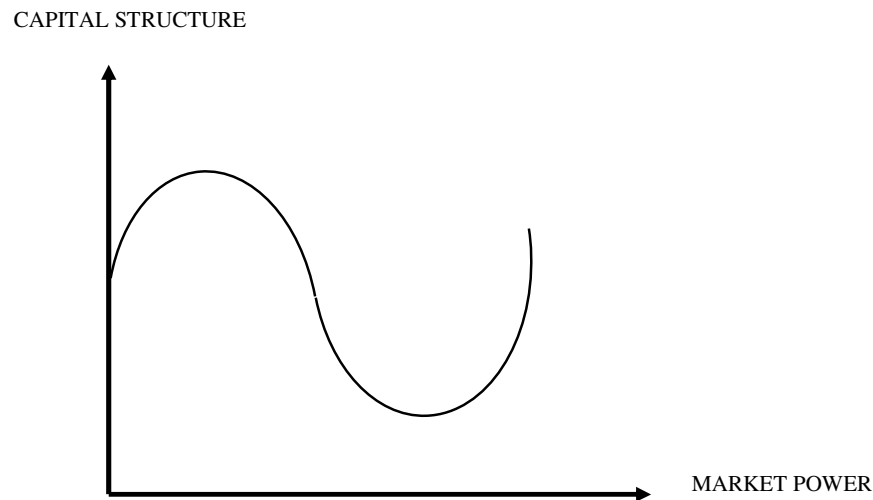
As reviewed in chapter 2, the relationship between capital structure and product market structure can be theoretically described by the existing arguments on capital structure and product market competition. Krishnaswamy et al. (1992) and Rathinasamy et al. (2000) suggested that the limited liability effect is more pronounced in a highly concentrated market. This implies that a high market power firm would find it more strategically advantageous to employ more debt, in order to commit to a product market strategy that increases its shareholders’ payoff. Accordingly, this approach predicts a positive relationship between capital structure and product market structure. On the other hand, a firm with ‘deep-pockets’ can engage in predatory action, in order to drive its highly leveraged rival out of the market. Hence, the predation model suggests a negative relationship.

Empirical evidence of the relationship between capital structure and product market structure (or market power in the operational meaning) is considerably limited, and hence, remains inconclusive. Krishnaswamy et al. (1992) found a

linearly positive relationship between the Lerner index and debt among U.S. firms. Using a large data set of 49 countries, for the period of 1987 to 1991, Rathinasamy et al. (2000) found that Tobin's q has a significant and positive effect on total and long-term debt. Firms with higher monopoly power use more total debt and long-term debt in their capital structure, thus the study concluded that these results support the limited liability and the risk-shifting hypothesis. In addition, Rathinasamy et al. (2000) investigated the impact of Tobin's q on leverage across a sample of 19 industries, and similarly found a positive relationship between Tobin's q and total and long-term debt. Their results show that a high market power firm (either a monopoly or an oligopoly firm) uses more debt, owing to the limited liability effect. On the contrary, Lovisuth (2003) found a negative relationship between the q ratio and debt, in a sample taken from the U.K. retailing industry. The results are generally consistent with the predation effect.

Whilst the above studies have observed a linear relationship between market power and capital structure, Pandey (2004) proposed the possibility of a non-linear cubic relationship, having used a sample of listed firms in Malaysia. Total debt to total assets ratio is used as the proxy for capital structure and the simplified q ratio is the measure of market power. Pandey (2004) suggested that non-linearity exists, owing to the opposite impacts of the limited liability effect on the one hand, and the deep purse argument on the other. His argument is illustrated in the following diagram below.

Figure 4.1: Pandey's Illustration of the Non-Monotonic Relationship¹²

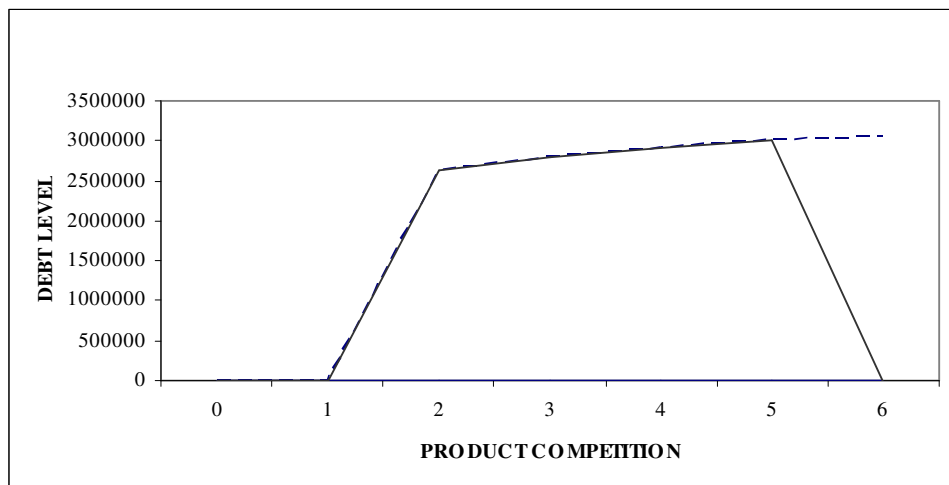


An oligopolistic firm strategically increases or decreases its levels of debt at different levels of market power. Because of the limited liability, shareholders are protected if adverse market conditions occur, therefore, a firm tends to employ high debt, in order to commit itself to producing high output and earning high profits at a low level of market power. This high profitability, however, attracts other low leveraged or unleveraged firms into the market. As a high debt level increases the probability of bankruptcy and financial distress to the high-leveraged firm occurring, the low or unleveraged rivals will adopt aggressive product strategies, either by reducing prices or increasing output, in order to drive the high-leveraged firm out of the market. At this intensified competition stage, the high-leveraged firm responds to this predation threat by reducing its debt level and increasing its production through improved asset utilisation. After consolidating its market position, once again, the firm increases its level of debt to expand its production. In sum, at low and high levels of market power, debt is strategically used to establish the market position of the firm. At the intermediate level of market power, where competition is intensified, the firm reduces its debt to avoid predation threats.

¹² This diagram is taken from Pandey (2004).

Based on Pandey's (2004) findings, Fairchild (2004b) theoretically examined the possibility of a non-linear relationship between market power and debt. Using a numerical example, Fairchild (2004b) also observed a non-linear (inverted U-shaped) relationship, owing to the limited liability and the predation effects. However, Fairchild's (2004b) findings and interpretations are somewhat different from those of Pandey's (2004). The following diagram illustrates his argument.

Figure 4.2: Fairchild's Illustration of the Non-Monotonic Relationship¹³



In Fairchild's (2004b) model, market power is the inverse measure of *potential* product market competition, which is represented by product differentiation. When product differentiation is high, firms are considered to have high market power in their own product markets, and thus the competitive interaction with each other is low. Fairchild (2004b) argued that debt has no strategic use at this high level of market power, because there is no competitive interaction among firms and hence, zero debt is observed at this level of market power (or, low level of product competition). As product differentiation diminishes (or equivalently, as their levels of market power decline), each firm engages in more intense competitive interaction. Fairchild (2004b) showed that firms increase their debt levels, in order to soften potential product market competition, that is, the limited

¹³ The diagram is adapted from Fairchild (2004b).

liability effect dominates the use of debt. As firms reach a certain level of product competition, the predation effect becomes dominant at these high levels of product competition (or at low levels of market power). A firm with low debt can steal market share, by setting a lower price than a firm with high debt, and therefore, in equilibrium firms reduce their use of debt at this high level of product competition (or low level of market power). Accordingly, Fairchild (2004b) argued that the relationship between capital structure and market power is positive, owing to the predation effect,¹⁴ whilst the limited liability effect predicts the negative relationship.

Another non-monotonic argument for product market structure and capital structure relationship is found in Lyandres (2006), who also suggested that the relationship takes an inverted U-shaped. However, his interpretation of the inverted U-shaped relationship is different from that of Fairchild (2004b). According to Lyandres (2006), at low levels of strategic interaction,¹⁵ a firm does not need any debt for strategic purposes, because its action in the product market does not have any effect on its rivals. At intermediate levels of strategic interaction, oligopolistic firms have an incentive to use debt for strategic benefits in the product market. This can be interpreted as the limited liability effect dominating the use of debt only for the intermediate level of market power.

In summary, the relationship between market power and capital structure remains complex, and this provides an issue for this chapter to explore. In general, prior studies appear to have reached the same conclusion that the linear relationship between capital structure and market power is mainly caused by, either the limited liability effect or the predation effect. A non-monotonic relationship is plausible, although contradicting conclusions do exist. On the one hand, there is the suggestion led by Pandey (2004) that high debt is strategically used at low and

¹⁴ Note that the 'predation effect' refers to the idea that at low degrees of product differentiation, if a firm sets a high debt level, the other firm can undercut by setting lower prices, in order to steal market share. Therefore, both firms reduce debt levels in equilibrium, to avoid the potential predation.

¹⁵ In terms of market structure, Lyandres (2006) argued that this refers to a firm in perfect competition and monopolistic competition.

high levels of market power, because of the limited liability effect. At the intermediate level of market power, the predation effect dominates and firms reduce their debt levels, in order to avoid predation threats. On the other hand, Fairchild (2004b) and Lyandres (2006) have argued that debt has no strategic use when a firm has high market power. Lyandres (2006) referred to a firm with high market power as a monopoly. Fairchild (2004b) interpreted a firm with high market power as being one with low competitive interaction with its rivals. At a low level of market power, where product competition intensifies, firms decrease debt levels to avoid predation. At the intermediate level of market power, the limited liability effect dominates, causing firms to use high levels of debt to soften price competition.

Although the use of Tobin's q as a market power proxy has concerned some researchers, Lindenberg and Ross (1981) argued that it is a theoretically sound proxy and in practice, one of the most powerful indicators of market power. The theoretical definition of Tobin's q is the ratio of the market value of the firm to the replacement cost of assets. When Tobin's q is higher than one, firms are expected to command some competitive advantage over their rivals. In a competitive market in which firms do not have much market power, Tobin's q equals one. The difficulty in using this formula lies with the limited availability and the accuracy of data on replacement cost of assets, particularly those of intangible assets. In response to this complication, Chung and Pruitt (1994) developed a much more simple formula for approximating Tobin's q . They showed that their simplified q ratio is a theoretically and practically sound version of Lindenberg and Ross's (1981) q ratio. Moreover, DaDalt et al. (2003) showed that the variations in results from using this simplified q ratio and the computationally costly algorithm version, such as the one used by Lindenberg and Ross (1981), are almost trivial, in an economic sense. Another benefit of using the simplified version of the q ratio, is that it requires only basic financial and accounting information. Chung and Pruitt (1994) defined the simplified q ratio, as the ratio of the sum of market value of equity and liquidating value of the firm's preferred stock, plus long-term debt and net current assets to the book value of total assets. Rathinasamy et al. (2000)

and Pandey (2004) have used this simplified q ratio in their studies. Moreover, it is noted that the former referred to the q ratio as market structure, whereas the latter specified it as the proxy for market power.

Other proxies of market structure, found in the industrial organisation literature, are: the Herfindahl-Hirschman index, the concentration ratio, and the Lerner index. Use of these proxies should be treated with caution, because their interpretation can be contradictory. For example, Lyandres (2006) argued that a high value of the Herfindahl-Hirschman index may be due to a low number of firms operating in the product market, thus suggesting high competitive interaction among rivals. However, a high Herfindahl-Hirschman index may be due to the high variation in the size of firms. That is to say, the larger the difference in sizes, the smaller is the expected impact that a firm may have on its counterparts.

High market concentration is often associated with monopolistic and oligopolistic product market structure. However, as argued by Lindenberg and Ross (1981) and Hirschey (1985), market power may or may not be evident in highly concentrated markets. Using Tobin's q as the market power proxy, Lindenberg and Ross (1981) did not find any significant relationship between Tobin's q and the concentration ratio. This suggests that a firm in a concentrated industry may not be endowed with high market power, and similarly, a high market power firm may be found in either a concentrated or an unconcentrated industry. In sum, market structure can be operationally expressed in terms of market power, but the term 'market power' does not necessarily imply a concentrated market structure.

As shown in the theoretical models given in chapter 3, the degrees of product differentiation are used as the measure of market power. Fairchild (2004b) argued that when the product differentiation is zero, each firm has local monopoly power. The firm has high market power owing to its highly differentiated product. At high levels of market power, a firm's interaction with its rival is low, whereas at low levels of market power, the firm engages in highly competitive interaction

with its rivals. A firm may have monopoly power, without necessarily being in a concentrated market. This empirical study follows Fairchild (2004b)'s interpretation of market power, and uses his definition throughout the chapter.

4.1.3 Firm-Specific Determinants of Capital Structure

This sub-section briefly reviews existing empirical work, regarding the effects of a firm's characteristics on capital structure. The variables included here are the proxies that appear most commonly in the research on capital structure. They empirically show how: the trade-off theory, the agency problems, and the pecking order theory, explain variations of capital structure. Nevertheless, it should be noted that the nature of the relationship between a variable and debt can differ, depending on the level of maturity of the debt.

Profitability

According to Myers's (1984) pecking order theory, a firm subject to information asymmetry depends on internally generated funds for its expansion, because external financing involves higher costs. Assuming the pool of retained earnings grows as the firm becomes more profitable, internal financing becomes more accessible and does not entail information costs as high as those of external financing. In addition, profitable firms prefer not to raise external equity, so as to avoid the potential dilution of ownership (Deesomsak et al., 2004). These arguments predict a negative relation between profitability and debt. On the contrary, Modigliani and Miller's (1963) tax shield theory suggested that a firm with high profits would employ high debt, because of tax shield benefits (i.e. corporate tax reduction). Furthermore, Jensen's (1986) free cashflow argument posited that a high profits firm will have high debt, to ensure that its managers pay out profits to the debt holders, rather than build up their personal empires. Accordingly, these arguments suggest a positive relation between debt and profitability.

In general, the existing empirical evidence supports the pecking order theory (Titman and Wessels, 1988; Thies and Klock, 1992; Rajan and Zingales, 1995; Michaelas et al., 1999; Wiwattanakantang, 1999; Booth et al., 2001; Nivorozhkin, 2002; Bevan and Danbolt, 2002; and Delcours, 2007). Pandey (2004) offered an explanation of the possibility of a non-linear relationship between leverage and profitability, involving both the pecking order and the tax shield theories. By using data from Malaysian listed companies, he found that at lower levels of profitability, firms employ more internal funds, because external funds are expensive, and non-debt tax shields, such as depreciation, may be more than sufficient to take advantage of tax benefits. As the level of profitability increases, firms increase their use of debt, in order to capture high tax shield benefits. The argument thus gives rise to a U-shaped relationship, with firms possibly not having an incentive to increase nor decrease debt in the medium ranges of profitability. Thies and Klock (1992) also found the effect of profitability on debt to be non-linear. To sum up, profitability has been measured in different studies as follows: the ratio of operating income to total assets (Titman and Wessels, 1988; and Rajan and Zingales, 1995), the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to total assets (Rathinasamy et al., 2000; Song and Philippatos, 2004; and Deesomsak, et al., 2004), the ratio of average earnings before interest and taxes (EBIT) to average total assets (Showalter, 1999; Thies and Klock, 1992; and Pandey, 2004), and the return on assets ratio (ROA) (Wiwattanakantang, 1999).

Tangibility

Tangible fixed assets can be used as collateral, which protects debtholders from the asset substitution problem, caused by the shareholders-debt holders conflict (Jensen and Meckling, 1976). Moreover, debt holders are more willing to supply loans, because tangible assets provide them with security in the event of financial distress. Tangible assets are the most widely accepted collateral for banking and raising secured debt (Song and Philippatos, 2004). The agency cost of debt suggests a positive relationship between tangibility and debt, which is supported by the empirical findings of: Titman and Wessels (1988); Rajan and Zingales

(1995); Wiwattanakantang (1999); Pandey (2004); Song and Philippatos (2004); and Kim et al. (2006). Moreover, Bevan and Danbolt (2002) argued that the relationship can depend on the components of debt. From their U.K. study, tangibility is positively related with long-term debt, but is negatively related with short-term debt. Nivorozhkin (2002) found a positive relationship with total debt but a negative relationship with short-term debt; Pindado et al. (2006) found a significant and positive relationship with long-term debt; and Michaelas et al. (1999) and Delcours (2007) found a positive relationship with all types of debt (total, short-term, and long-term). The most widely used proxy for tangibility is the ratio of fixed assets to total assets (Rajan and Zingales, 1995; Wiwattanakantang, 1999; Nivorozhkin, 2002; Deesomsak et al., 2004; and Song and Philippatos, 2004).

Size

Rajan and Zingales (1995) suggested that larger firms are more diversified and less prone to bankruptcy, and are thus expected to incur lower costs in issuing debt, than smaller firms. Therefore, size can be interpreted as an inverse proxy for bankruptcy. This argument predicts a positive relationship between size and debt. Michaelas et al. (1999) argued that the agency conflict between shareholders and debt holders may be particularly severe for small firms. However, lenders can manage the risk of lending to smaller firms by restricting the maturing of debt. This argument suggests that smaller firms will have less long-term, but more short-term debt. In general, previous empirical studies have supported the argument that there is a positive relationship between debt and size (Rajan and Zingales, 1995; Barclay and Smith, 1996; Wiwattanakantang, 1999; Booth et al., 2001; and Pandey, 2001, 2004). Proxies that are used for size are: the natural log of sales (Titman and Wessels, 1988; Rajan and Zingales, 1995; Wiwattanakantang, 1999; Nivorozhkin, 2002; and Pandey 2004), and the natural log of average total assets (Showalter, 1999; and Song and Philippatos, 2004).

Liquidity

Liquidity is defined as the ratio of current assets to current liabilities (the current ratio). According to the pecking order theory, a firm with high liquidity prefers retained earnings to external borrowings. In addition, the agency costs argument suggests that a firm's manager could manipulate liquid assets in favour of shareholders, but against the debt holders' interests. This increases the agency costs of debt, which encourages the firm to borrow less and accordingly, a negative relationship is predicted (Deesomsak et al., 2004).

Risk or earning volatility

Higher risk or earnings volatility implies an increase in the probability of financial distress, which prevents firms from fulfilling their debt commitments, that is, firms experiencing this situation have a low debt capacity and thus accordingly, a negative relationship between debt and earnings volatility is predicted (Fan et al., 2001; Pandey, 2004; and Kim et al., 2006). Thies and Klock (1992) and Prasad et al. (2001) found a positive relationship for short-term debt but a negative relationship for long-term debt. Michaelas et al. (1999) found a positive relationship for all types of debt, whereas Delcours (2007) found a negative one for all types of debt. Risk or earning volatility has been measured by: the standard deviation of the first differences in earnings, before interests and tax (EBIT), over the relevant time period, divided by average EBIT during the same period (Showalter, 1999 and Deesomsak et al., 2004); the standard deviation of the first differences in earning before interests and tax (EBIT), over the relevant time period, divided by total assets (Wald, 1999); the standard deviation of the return on assets (Booth et al., 2001); the standard deviation of net income (Song and Philippatos, 2004); and weekly share price data (Pandey, 2004).

Growth and investment opportunities

The relationship between debt and investment opportunity is ambiguous. According to Myers (1977), an immature firm with many intangible investment opportunities is more likely to suffer loss in value from the debt overhang (under investment) problem. Thus, this type of firm, whose growth depends on future

investment opportunities, should carry low levels of debt. A mature firm with few investment opportunities, and whose value reflects the cashflows from tangible assets in place, incurs lower expected costs associated with financial distress and such a company should have higher leverage ratios, than an immature firm. Similarly, Jensen's (1986) free cashflow argument suggested that a mature firm with substantial free cashflow should employ more debt, in order to reduce the agency costs of equity. These theories help predict a negative relationship. However, Myers (1977) suggested that the conflicts of interest between shareholders and debt holders can be mitigated, by increasing the use of short-term debt. Therefore, a positive relationship between short-term debt and investment opportunities is predicted. According to the pecking order theory, the information costs associated with issuing debt are lower than those of equity and hence, a high growth firm will have high leverage ratios, whereas a firm with few investment opportunities will have low debt levels. This predicts a positive relationship. However, a negative relationship has been found in: Titman and Wessels (1988); Barclay et al. (1995); Barclay and Smith (1996); Rajan and Zingales (1995); Fan et al. (2003) and Deesomsak, et al. (2004). On the other hand, the following have found a positive relationship for all types of debt: Thies and Klock (1992); Michaelas et al. (1999); Booth et al. (2001); Pandey (2001); Delcours (2007). Bevan and Danbolt (2002) found a positive relationship, regarding total and short-term debt, but a negative relationship regarding long-term debt, whereas Pandey (2001) found no significant relationship, for all types of debt. In previous studies, growth has been measured as: one plus growth rate derived by regressing log of sales to time (Pandey, 2001); one plus annual change in assets (Pandey, 2004); and the market-to-book value ratio (Barclay et al., 1995; Rajan and Zingales, 1995; Wiwattanakantang, 1999; and Nivorozhkin, 2002).

Non-debt tax shields

According to tax-based theory, the benefit that comes from using debt financing is corporate tax deduction. DeAngelo and Masulis (1980) argued that non-debt tax shields are substitutes for debt's interest tax shields. Given this argument, a negative relationship between non-debt tax shields and debt is expected. A firm

with large non-debt tax shields, such as: tax deductions for depreciation, investment tax credits and pension funds, generally uses less debt. In general, most empirical studies have found a negative relationship (Wiwattanakantang, 1999; Suto, 2003; Deesomsak et al., 2004; Du and Dai, 2005; Pindado et al., 2006; and Kim et al., 2006). In contrast, Michaelas et al. (1999) found a negative relationship for long-term debt, but an insignificantly positive relationship for total and short-term debt. Delcours (2007) found a positive relationship for all types of debt (i.e. total, short-term and long-term debt ratios). A possible explanation for the positive relationship is that non-debt tax shields may be viewed as the firm's assets securability, with more securable assets leading to higher use of debt (Bradley et al, 1984). Proxies for non-debt tax shields include: the ratios of investment tax credits over total assets, the depreciation-to-total assets ratio (Wiwattanakantang, 1999; Song and Philippatos, 2004; and Deesomsak et al., 2004), and the ratio of the observed federal income tax payments, operating income, interest payments and the corporate tax rate during the sample period, to total assets (Titman and Wessels, 1988).

4.2 Methodology

4.2.1 Description of Data and Variables

This study uses firm-level data obtained from the CEIC Asia database, available on <http://www.securities.com>. The CEIC Asia database provides financial information on listed and non-listed companies across the industry sectors of countries in Asia. The financial information comprises: profit and loss accounts, balance sheets, cashflow statements, and key financial ratios. The database provides data dating back ten years, or more, for a few companies, which provides a substantial numbers of observation for the study. The list of companies included in the CEIC Asia database is extensive, unfortunately however, it is often found that some financial items and values on financial statements are missing. For instance, there is no reporting for items, such as: interest expenditures, research and development expenses, depreciation and amortisation on every sample

company's profit and loss accounts. Moreover, there is not much detail on what has been deducted from the 'sales' item, in order to derive the 'earnings before tax' item. The insufficiency of data, therefore, hinders this empirical study in its construction of some variables, such as the non-debt tax shields or the more conventional profitability proxies that other empirical studies have used, for example, the ratio of EBITDA to total assets and the ratio of EBIT to total assets. Despite these drawbacks, the CEIC Asia is one of most accessible databases for data on developing countries. Overall, the database has enough information for this study to calculate the many variables that are known to be relevant in an empirical study of capital structure.

Four Southeast Asian countries, namely: Indonesia, Malaysia, the Philippines, and Thailand, are used as case-studies. The motivation for using these countries is the lack of empirical studies providing cross-country analysis, especially in the Asian emerging economy markets context. Prior to the 1997 financial crisis, these countries were dubbed the Southeast Asian tigers.¹⁶ They experienced high economic growth, owing to their substantially high export-driven trade strategy and high foreign direct investments. Financial liberalisation, during the early 1990s, enabled firms to obtain loans from foreign investors. Their capital markets were less developed compared to those in developed countries, and were thus considered to be at an early stage of development. Hence, issuing equity and shares was not a major financing source for firms in these countries. Recently, bond markets have started to develop under the financial reforms carried out after the financial crisis. Moreover, most firms preferred borrowing from banks, in order to avoid the dilution of ownership. These factors have contributed to the fact that bank borrowing has always been a dominant source of financing in these countries.

The obtained firm-level data comprise a complete data set of listed companies across the industry sectors: agriculture, service, IT, manufacturing, mining, real

¹⁶ Some studies consider Vietnam as one of the tigers, but it is excluded from the study, owing to its insufficient dataset.

estate, trade (wholesale and retail), transportation and warehouse, and construction. The sample covers the most recent ten year time period, that is 1997 to 2006 and the data in 1996 was obtained to calculate the risk variable. The standard elimination process was employed, that is to say, companies in the financial and regulated utility sectors, and companies with the relevant data missing, were excluded. The final sample consists of 353 listed companies of which: 96 are from Indonesia, 84 are from Malaysia, 75 are from the Philippines, and 98 are from Thailand. This sample forms a balanced panel data set for each individual country. The use of panel data, not only improves the sample size of the observations, but also provides richer analysis than cross-sectional and time-series studies. Panel data also allows for the controlling of individual unobserved heterogeneity (Baltagi, 2005).

Consistent with the theoretical models given in the previous chapter, the main purpose of this empirical study is to investigate the potential impact market power may have on *long-term debt*. Nonetheless, insights into any differences in the market power effect and the impacts of a firm's characteristics have on *short-term debt*, are also potentially beneficial. There is the possibility that a firm may have different policies, regarding the maturity structure of debt. *Total debt* is also included in this study to investigate the effects of firm-specific variables on the total debt position of firms in the sample. Long-term debt is defined as the sum of borrowing repayable over one year, whereas short-term debt refers to the borrowing repayable within one year and total debt is defined as the sum of the previous two. All three types of debt are normalised by the book value of total assets, in order to construct three types of leverage ratios. The discussion regarding using book value, instead of the market value of debt, without any misspecification problems, has already been well explained in previous studies (Titman and Wessels, 1988, and Rajan and Zingales, 1995).¹⁷ As noted by Pandey (2004), firms in most developing countries, including the sample countries, often

¹⁷ Short-term and long-term leverage ratios measured at market value were previously included in this study. The results are very similar to those of book value, therefore, this study uses only the book value of leverage.

substitute short-term for long-term borrowings, and roll over short-term debts and this is certainly applicable to Indonesian firms, as noted by Nagano (2003). However, given the information on the CEIC Asia database, it is impossible to clarify whether the item 'short-term borrowings' is short-term debt or a current portion of long-term debt, due in that year. As a result, the short-term leverage ratios may be overstated and this is a caveat to bear in mind.

As suggested by Pandey (2004), price and quantity or segmental data are not usually available for developing countries, therefore it is difficult to construct proxies, such as: the Lerner index or the Herfindahl-Hirschman index. Given the availability of the data, the study will use the simplified q ratio, given by Chung and Pruitt (1994) as the market power proxy. The method was similarly employed by Rathinasamy et al. (2000) and Pandey (2004) and thus the results from this study can more easily be compared with these other studies.

Thus, q ratio is defined as:

$$Q = (\text{market value of equity} + \text{liquidating value of preferred stock} + \text{net current assets} + \text{long-term debt}) / \text{book value of total assets}.$$

Other firm-specific variables: profitability, tangibility, size, liquidity, and risk, are included as control variables in this study. The choice of these is based on prior empirical studies and the availability of data. Interest expenses and depreciation items are not reported in the database, so therefore the study cannot construct the conventional profitability proxies, such as: the ratio of EBIT and EBITDA to total assets. The return on assets ratio is therefore used as the proxy for profitability, because it is the only variable which has complete data for every company. The ROA ratio is already provided by the database.

It has been observed that a few studies of the determinants of capital structure have used Tobin's q, as the proxy for investment opportunities (Titman and Wessels, 1988; Barclay et al., 1995; Rajan and Zingales, 1995; and Barclay and

Smith, 1996). Therefore this control variable, although it appears to be an important determinant of capital structure, will not be included in this research. This is to avoid the problem of misinterpretation of the proxy.

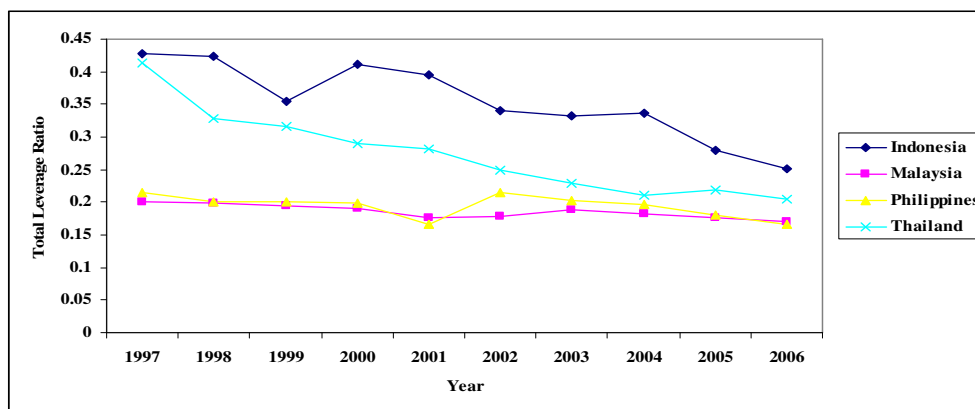
As noted in Titman and Wessels (1988), selecting a proxy for a variable is always the predominant problem in an empirical study and this is certainly applies in this case. Moreover, the CEIC database does not provide data for depreciation values, which does not permit the study to include a non-debt tax shields variable. The control variables are defined by following methods employed in prior empirical studies. Table 4.1 summarises the definition of the dependent variables, the market power proxy, and other control variables for this work.

Table 4.1: Definition of Variables

Variable	Definition
Long-term leverage	Borrowings payable over one year / total assets
Short-term leverage	Borrowings payable within one year / total assets
Total leverage	Sum of long-term and short-term borrowings / total assets
q ratio	(Market value of equity + liquidating value of preferred stock + net current assets + long-term debt) / total assets
Profitability	Return on assets ratio (ROA)
Tangibility	Fixed assets / total assets
Size	Natural log of total assets
Liquidity	Current assets / current liabilities
Risk	Absolute annual change of retained earnings

Figure 4.3 depicts the annual average total leverage ratios of the sample countries, from 1997 until 2006, whereas table 4.2 presents a summary of the descriptive statistics.

Figure 4.3: Total Leverage Ratios of Sample Countries: 1997-2006



The above diagram and the descriptive statistics in table 4.2, reveal that sample firms in Indonesia and Thailand were consistently more leveraged, than those in Malaysia and the Philippines. The leverage ratios of the two former countries were significantly high, particularly in 1997 and this observation reflects the fact that Indonesia and Thailand were most severely affected by the 1997 financial crisis. The large depreciation of the local currencies and a fall in equity value may have contributed to this high level of debt.

As shown in table 4.2, the mean values of long-term debt are slightly higher than short-term debt for all the sample countries except Thailand. This is rather surprising, given that short-term borrowing is considered a dominant source of financing in developing countries. The mean values of the q ratio show that, on average, firms do not have any competitive advantage over their rivals. Less than 25% of sample firms in Indonesia, Malaysia, and Thailand have high market power. This suggests that majority of sample firms engage in a competitive product market. The negative mean values of profitability, suggest that the sample firms in Indonesia and the Philippines experienced losses in their incomes. The collateral value of assets (tangibility) is similar across the sample countries, at approximately 40% of total assets. The mean values of the current ratio (liquidity) indicate sound liquidity of firms in the sample countries and their ability to pay debt obligations. The average of risk or the earning volatility of the sample

countries ranges from a low of 1.6 among Malaysian firms, to a high of 2.4 among Indonesian firms. For Thailand and the Philippines, the average values for this are 1.8 and 1.7, respectively. These figures are more than their 75th percentile values, which suggests that about 25% of firms in each sample country have significantly high earnings volatility.

Table 4.3 provides the correlation matrix for the different types of leverage and the independent variables. The matrix shows that the q ratio is negatively correlated with short-term and total leverage, but is positively correlated with long-term leverage. Profitability and liquidity are negatively correlated with all types of leverage, which appears to be consistent with Myers's (1984) pecking order theory, that a firm with high retained earnings and profits tends to borrow less. Size is positively correlated with all types of leverage, suggesting that a larger firm is more able to raise capital, via borrowing, than a smaller firm. Earning volatility or risk is positively correlated with all types of leverage. While tangibility is positively correlated with total and long-term leverage, it is negatively correlated with short-term leverage. The significantly positive correlation of the q ratio with profitability and liquidity, suggests that a high market power firm tends to have high profits and more ability to meet its creditors' demands.

Table 4.2: Summary of the Descriptive Statistics

	LT lev.	ST lev.	Total lev.	q ratio	Profitability	Tangibility	Size	Liquidity	Risk
Indonesia									
Mean	0.189	0.166	0.355	0.611	-0.012	0.409	26.805	1.545	2.379
Std. Dev.	0.241	0.251	0.313	0.942	0.193	0.216	1.81	1.313	4.96
Minimum	0	0	0	-5.062	-1.984	0.009	16.811	0.023	0.0002
Maximum	2.654	2.178	2.915	6.521	1.139	0.9657	31.567	9.245	49.114
25th Percentile	0.005	0	0.127	0.195	-0.055	0.230	25.863	0.662	0.314
Median	0.106	0.070	0.305	0.654	0.021	0.399	26.914	1.211	0.852
75th Percentile	0.309	0.223	0.503	1.069	0.079	0.582	27.885	2.04	2.19
Observations	960	960	960	960	960	960	960	960	960
Malaysia									
Mean	0.101	0.084	0.185	0.874	0.031	0.436	19.371	2.454	1.574
Std. Dev.	0.131	0.109	0.169	1.193	0.080	0.215	1.373	3.375	3.732
Minimum	0	0	0	-1.872	-0.711	0.004	14.920	0.023	0.002
Maximum	0.746	1.123	0.123	22.980	0.332	0.970	23.021	35.282	41.293
25th Percentile	0.001	0.003	0.036	0.411	0.006	0.296	18.338	0.98	0.212
Median	0.046	0.044	0.148	0.699	0.034	0.436	19.349	1.614	0.523
75th Percentile	0.166	0.122	0.302	1.078	0.072	0.561	20.18	2.68	1.155
Observations	840	840	840	840	840	840	840	840	840

Table 4.2: Summary of the Descriptive Statistics (continued)

	LT lev.	ST lev.	Total lev.	q ratio	Profitability	Tangibility	Size	Liquidity	Risk
Philippines									
Mean	0.100	0.094	0.194	0.608	-0.011	0.360	20.681	1.979	1.682
Std. Dev.	0.213	0.135	0.243	0.743	0.194	0.270	2.301	3.036	3.279
Minimum	0	0	0	-2.528	-3.310	0	8.357	0.01	0.001
Maximum	3.355	0.913	0.355	7.843	0.955	0.962	26.243	27.984	34.208
25th Percentile	0	0	0.018	0.213	-0.04	0.093	19.338	0.653	0.273
Median	0.025	0.048	0.113	0.506	0.011	0.374	20.962	1.175	0.625
75th Percentile	0.143	0.127	0.288	0.914	0.046	0.543	22.273	2.032	1.344
Observations	750	750	750	750	750	750	750	750	750
Thailand									
Mean	0.129	0.145	0.274	0.802	0.051	0.462	21.505	1.894	1.798
Std. Dev.	0.185	0.178	0.244	0.666	0.090	0.221	1.349	1.860	6.076
Minimum	0	0	0	-1.679	-0.598	0.018	17.134	0	0
Maximum	1.128	1.051	1.136	4.290	0.448	0.957	25.292	16.291	120.596
25th Percentile	0	0.005	0.051	0.391	0.008	0.292	20.543	0.811	0.204
Median	0.041	0.073	0.228	0.711	0.054	0.443	21.55	1.244	0.547
75th Percentile	0.196	0.232	0.45	1.128	0.098	0.629	22.273	2.317	1.422
Observations	980	980	980	980	980	980	980	980	980

Table 4.3: Correlation Matrix (3530 Firms/Years Pooled Observations)

	LT lev.	ST lev.	Total lev.	q ratio	Profitability	Tangibility	Size	Liquidity	Risk
LT lev.	1								
ST lev.	-0.095	1							
Total lev.	0.708	0.636	1						
q ratio	0.078	-0.389	-0.216	1					
Profitability	-0.216	-0.25	-0.345	0.308	1				
Tangibility	0.282	-0.05	0.183	-0.073	-0.059	1			
Size	0.211	0.11	0.242	-0.013	0.009	0.002	1		
Liquidity	-0.154	-0.278	-0.316	0.301	0.155	-0.173	-0.16	1	
Risk	0.052	0.107	0.116	-0.111	-0.153	0.024	0.039	-0.075	1

The correlation coefficients are based on pooled ordinary least squares (OLS).

4.2.2 Estimation Strategy

4.2.2.1 The Static Model

The aim of this static model study is to examine the impact of market power on three types of leverage. Some firm-specific factors are also included as control variables. Accordingly, the empirical model is expressed as:

$$(1) \text{leverage}_{it} = \beta_k X_{it} + \varepsilon_{it},$$

with $i = 1, \dots, N$ th firm of each sample country; $t = 1997, \dots, 2006$. leverage_{it} is one of the three leverage ratios (long-term, short-term, total leverage) for the i th firm at time t . X_{it} is a $1 \times k$ vector of independent variables that vary over individual and time, β is the $k \times 1$ vector of coefficients on X . $\varepsilon_{it} = v_i + u_{it}$, where v_i is a firm-specific time-invariant effect and u_{it} is the disturbance term.

The three leverage ratios are alternately regressed on the q ratio, profitability, tangibility, size, liquidity, and risk for each sample country. The equation (1) can be re-written as:

$$(2) \text{long-term leverage}_{it} = \alpha_0 + \alpha_1 (q \text{ ratio}_{it}) + \alpha_2 (\text{profitability}_{it}) + \alpha_3 (\text{tangibility}_{it}) \\ + \alpha_4 (\text{size}_{it}) + \alpha_5 (\text{liquidity}_{it}) + \alpha_6 (\text{risk}_{it}) + \varepsilon_{it}.$$

$$(3) \text{short-term leverage}_{it} = \delta_0 + \delta_1 (q \text{ ratio}_{it}) + \delta_2 (\text{profitability}_{it}) + \delta_3 (\text{tangibility}_{it}) \\ + \delta_4 (\text{size}_{it}) + \delta_5 (\text{liquidity}_{it}) + \delta_6 (\text{risk}_{it}) + \varepsilon_{it}.$$

$$(4) \text{total leverage}_{it} = \mu_0 + \mu_1 (q \text{ ratio}_{it}) + \mu_2 (\text{profitability}_{it}) + \mu_3 (\text{tangibility}_{it}) + \\ \mu_4 (\text{size}_{it}) + \mu_5 (\text{liquidity}_{it}) + \mu_6 (\text{risk}_{it}) + \varepsilon_{it}.$$

Whilst the pooled ordinary least squares (OLS) estimation is a common technique in the capital structure research, some studies have argued that this method may

have failed to account for time invariant firm-specific heterogeneity. Failure to control for heterogeneity will cause the parameter estimation to be biased and inconsistent, which may lead to inappropriate conclusions (Baltagi, 2005). To counter these limitations, one-way fixed effect (FE) and random effect (RE) estimations are employed. Subsequently, the Hausman test is performed with the null hypothesis that the RE estimator is consistent. If the null hypothesis is rejected, the FE estimator is preferred. The two-way fixed effects estimation is also used, to estimate the equations (2), (3), and (4), to control for any firm-specific heterogeneity as well as any time effect.

The study also examines the possibility of a non-linear relationship between capital structure and market power, as suggested by Pandey (2004) and Fairchild (2004b). To address this non-linear relationship, q^2 and q^3 are incorporated into the equations (2)-(4). The equations (2)-(4) can be augmented as follows:

$$(5) \text{ long-term leverage}_{it} = \alpha_0 + \alpha_1 (q \text{ ratio}_{it}) + \alpha_2 (q \text{ ratio}_{it})^2 + \alpha_3 (q \text{ ratio}_{it})^3 + \alpha_4 (\text{profitability}_{it}) + \alpha_5 (\text{tangibility}_{it}) + \alpha_6 (\text{size}_{it}) + \alpha_7 (\text{liquidity}_{it}) + \alpha_8 (\text{risk}_{it}) + \varepsilon_{it}.$$

$$(6) \text{ short-term leverage}_{it} = \delta_0 + \delta_1 (q \text{ ratio}_{it}) + \delta_2 (q \text{ ratio}_{it})^2 + \delta_3 (q \text{ ratio}_{it})^3 + \delta_4 (\text{profitability}_{it}) + \delta_5 (\text{tangibility}_{it}) + \delta_6 (\text{size}_{it}) + \delta_7 (\text{liquidity}_{it}) + \delta_8 (\text{risk}_{it}) + \varepsilon_{it}.$$

$$(7) \text{ total leverage}_{it} = \mu_0 + \mu_1 (q \text{ ratio}_{it}) + \mu_2 (q \text{ ratio}_{it})^2 + \mu_3 (q \text{ ratio}_{it})^3 + \mu_4 (\text{profitability}_{it}) + \mu_5 (\text{tangibility}_{it}) + \mu_6 (\text{size}_{it}) + \mu_7 (\text{liquidity}_{it}) + \mu_8 (\text{risk}_{it}) + \varepsilon_{it}.$$

Many studies have asserted the importance of industry effects. Myers (1977) suggested that debt ratios vary from industry to industry, but firms within the same industry could be expected to have similar debt ratios. He suggested that the agency conflict between shareholders and debt holders is more severe in a firm whose value depends on investment opportunities, rather than tangible assets.

However, previous evidence has suggested that short-term debt can mitigate the agency cost problem. This intuitively suggests that a firm in the manufacturing and trade sector would be expected to have more long-term debt, but less short-term debt, than a firm in IT or the service sector. To account for this, equations (2), (3), and (4) are augmented to include nine industry dummies. Each represents an industry sector, these are: agriculture, IT, manufacturing, mining, trade, transportation, real estates, and service. They are re-written as follows:

$$\begin{aligned}
 (8) \text{ long-term leverage}_{it} = & \alpha_0 (q \text{ ratio}_{it}) + \alpha_1 (\text{profitability}_{it}) + \alpha_2 (\text{tangibility}_{it}) \\
 & + \alpha_3 (\text{size}_{it}) + \alpha_4 (\text{liquidity}_{it}) + \alpha_5 (\text{risk}_{it}) + \alpha_6 (\text{dagri}) + \\
 & \alpha_7 (dIT) + \alpha_8 (dmanu) + \alpha_9 (dmining) + \alpha_{10} (dtrade) + \\
 & \alpha_{11} (dtransport) + \alpha_{12} (drealestate) + \alpha_{13} (dservice) \\
 & + \varepsilon_{it}.
 \end{aligned}$$

$$\begin{aligned}
 (9) \text{ short-term leverage}_{it} = & \delta_0 (q \text{ ratio}_{it}) + \delta_1 (\text{profitability}_{it}) + \delta_2 (\text{tangibility}_{it}) \\
 & + \delta_3 (\text{size}_{it}) + \delta_4 (\text{liquidity}_{it}) + \delta_5 (\text{risk}_{it}) + \delta_6 (\text{dagri}) + \\
 & \delta_7 (dIT) + \delta_8 (dmanu) + \delta_9 (dmining) + \delta_{10} (dtrade) + \\
 & \delta_{11} (dtransport) + \delta_{12} (drealestate) + \delta_{13} (dservice) \\
 & + \varepsilon_{it}.
 \end{aligned}$$

$$\begin{aligned}
 (10) \text{ total leverage}_{it} = & \mu_0 (q \text{ ratio}_{it}) + \mu_1 (\text{profitability}_{it}) + \mu_2 (\text{tangibility}_{it}) + \\
 & \mu_3 (\text{size}_{it}) + \mu_4 (\text{liquidity}_{it}) + \mu_5 (\text{risk}_{it}) + \mu_6 (\text{dagri}) + \\
 & \mu_7 (dIT) + \mu_8 (dmanu) + \mu_9 (dmining) + \mu_{10} (dtrade) + \\
 & \mu_{11} (dtransport) + \mu_{12} (drealestate) + \mu_{13} (dservice) + \varepsilon_{it}.
 \end{aligned}$$

The LSDV (the least square dummy variable) is employed to estimate the equations (8), (9), and (10). The ‘without constant’ option of the LSDV available in STATA is used to estimate the equations.

4.2.2.2 The Dynamic Panel Model

In the static model, it is assumed that the actual capital structure is instantaneously adjusted towards the target level. In this sub-section, the dynamic panel model is introduced to shed light on whether firms have a target capital structure and, if so, is there any heterogeneity of the adjustment speed of leverage types across the sample countries. A positive and below unity coefficient would suggest that a firm has a target debt level and revises its capital structure over time. In order to examine the above, a one-period lagged dependent variable is added to the estimation equation.

This follows de Miguel and Pindado (2001) argument that the target leverage ratio of a firm is a function of market power and firm-specific factors, expressed as:

$$(11) \text{leverage}_{it}^* = \beta_k X_{it} + \varepsilon_{it}$$

Equation (11) addresses the fact that a firm adjusts its level of optimal leverage, leverage_{it}^* , rather than its observed debt, according to the levels of various capital structure determinants. Because of the existence of the adjustment costs, the firm does not fully adjust its debt level to the target level within that time period. Instead, the firm partially adjusts its debt level, as represented by the following equation:

$$(12) \text{leverage}_{it} - \text{leverage}_{it-1} = \alpha (\text{leverage}_{it}^* - \text{leverage}_{it-1}),$$

where leverage_{it} and leverage_{it-1} are the actual debt levels in the current period and previous period, respectively. leverage_{it}^* is the firm's target debt level. The coefficient, α , represents the speed of adjustment of leverage_{it} towards its target level, leverage_{it}^* . The speed of adjustment is restricted by the boundary $0 \leq \alpha \leq 1$ (de Miguel and Pindado, 2001; Song and Philippatos, 2003).

If $\alpha = 1$, $leverage_{it} = leverage_{it}^*$ and the firm adjusts its debt level to the target level within one period. If $\alpha = 0$ then $leverage_{it} = leverage_{it-1}$, which implies that the actual debt level is not adjusted to the target level and debt remains at the level of the previous period. Alternatively, α can be interpreted as a measure of the adjustment cost. When the cost is zero (i.e.) $\alpha = 1$, the firm can fully adjust its debt level, owing to the absence of the adjustment cost. On the contrary, the firm is not able to adjust its debt towards the target level when the adjustment cost is high, $\alpha = 0$. For cases where $0 \leq \alpha \leq 1$, the firm adjusts its debt level in a way that is inversely proportional to the adjustment cost.

Re-arranging equation (12) to find the actual debt level,

$$(13) \text{ leverage}_{it} = \alpha \text{ leverage}_{it}^* + (1 - \alpha) \text{ leverage}_{it-1}.$$

Substituting $leverage_{it}^*$ from equation (11) into equation (13),

$$(14) \text{ leverage}_{it} = (1 - \alpha) \text{ leverage}_{it-1} + \alpha (\beta_k X_{it}) + v_i + u_{it}.$$

In the static model, the study assumes that there is no endogeneity problem. However, as noted in many previous studies, such an assumption is somewhat naïve. The independent variables used could be determined simultaneously with the leverage ratio. To alleviate this problem, a two-step generalised method of moments (GMM) technique is followed. The lagged dependent variable and other independent variables are transformed, by using the first differences as proposed by Arellano and Bond (1991). As a result, these variables are used as instruments, which also allow for the consideration of possible measurement errors in the variables. The Sargan test is performed to test the validity of the instrument variables. The Sargan statistic is distributed as a χ^2 (p-k), where p is the instrument rank and k is the number of estimated coefficients. P-values must be greater than 0.05, in order to conclude that the instruments are valid. That is, one cannot reject the null hypothesis of valid over-identifying restrictions. As noted in previous

empirical studies, the ordinary least squares estimation (OLS) would yield biased coefficients, because of the correlation of $leverage_{it-1}$ with v_i . The first differences transformation described above also eliminates any time-invariant firm-specific effect, v_i .

4.3 Empirical Results

4.3.1 The Static Model

In general, the Hausman test has shown that the FE estimator is preferred to the RE estimator, as shown by the rejection of the null hypothesis. The results of the one-way fixed effect, the random effect, and the two-way fixed effects estimators yield similar results. Therefore, this researcher has decided to report and analyse only the results of the two-way fixed effects model.¹⁸ Table 4.4 reports the results of the linear regressions, i.e. equations (2)-(4), whereas table 4.5 presents the results of the non-linear equations (5)-(8). Column a, b, and c for each sample country provides the results for long-term, short-term, and total leverage, respectively. The results in table 4.6 are the estimations of the LSDV models for the industry effect. Panel A, B, and C, respectively, report the results for long-term, short-term, and total leverage. The linear effects of market power will be discussed first. The non-linear effects of market power, the impacts of other firm-specific factors, and the industry effect will then be sequentially analysed.

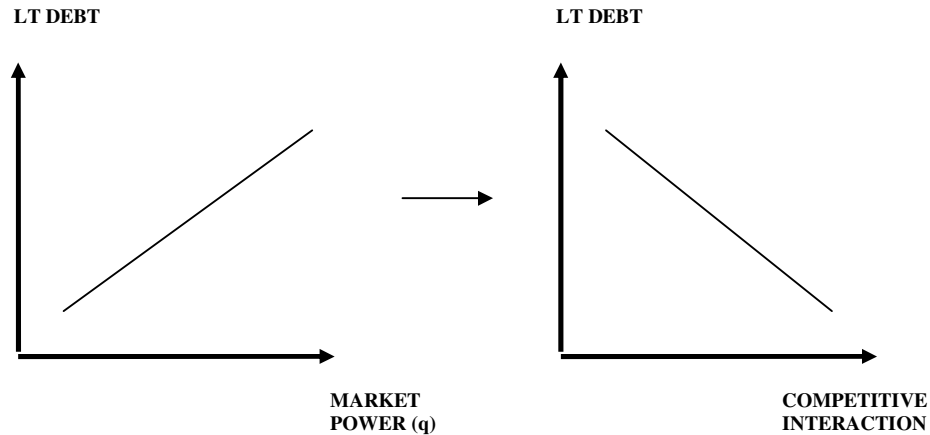
4.3.1.1 The Linear and the Non-linear Effects of Market Power

The positive coefficients of q ratio in table 4.4 reveal a positive relationship between market power and long-term debt. The adjusted t-statistics, suggest further, that the effect of market power is statistically significant in all the sample countries, with the exception of Malaysia. The results appear to suggest the presence of the predation effect on long-term leverage, which is particularly dominant at low levels of market power, or inversely interpreted, at high levels of

¹⁸ The results of the one-way FE and RE estimators are in the appendix.

competitive interaction. The diagrams in figure 4.4 illustrate the positive effect of market power (or the negative effect of competitive interaction) on long-term debt.

Figure 4.4: The Effect of Market Power on Long-term Debt.

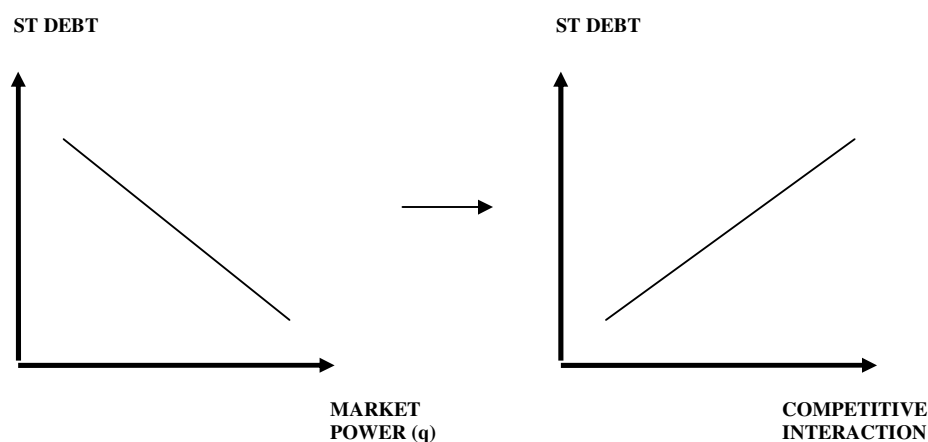


When product competition is highly intensified, as reflected in low levels of market power, a firm avoids any possible predation threat from its rivals, by not using high amounts of long-term leverage. This result appears to be consistent with the spatial model developed in the previous chapter. Recall that in the spatial model, long-term debt is decreasing with potential product market competition. The predation effect dominates the use of long-term debt.

Although the positive relationship between long-term debt and q ratio is consistent with Rathinasamy et al. (2000), the interpretation is different. Rathinasamy et al. (2000) argued that the positive effect of q ratio on long-term debt is due to the limited liability effect and a high market power firm uses more long-term debt to increase output. In this empirical study, market power is interpreted as the inverse measure of competitive interaction. The predation effect dominates the use of long-term debt, such that as market power decreases (or as competitive interaction increases), a firm reduces its long-term debt, in order to avoid any predation action from less-leveraged rivals.

The results in table 4.4 show that the negative coefficients of q ratio, in the short-term leverage equation, are statistically significant for every sample country. This implies the presence of the limited liability effect. As illustrated in figure 4.5 below, the negative effect of market power on short-term debt, can be interpreted as indicating that a firm strategically increases the use of short-term debt, as competitive interaction intensifies. This is consistent with prior studies of capital structure and product market competition, that posited that short-term debt commits a firm to adopt a product market strategy that increases shareholders' payoffs, when the firm engages in product market competition with its rivals (for example, Brander and Lewis, 1986; Showalter, 1995).

Figure 4.5: The Effect of Market Power on Short-term Debt.



The t -statistics of total leverage are not found to be significant, except for that of Indonesia. This might suggest that whilst market power has an impact on the maturity of debt, it does not seem to influence a firm's position of total debt.

From the two-way fixed effects results of non-linear regressions in table 4.5, the coefficients of q ratio in the 'a' columns also show a positive correlation between market power and long-term debt. The predation effect dominates the use of long-term debt. On the other hand, column 'b', for each of the sample countries, shows that short-term debt is decreasing with market power (or increasing with

competitive interaction), as shown by significantly the negative effects of q ratio on short-term leverage. The limited liability effect dominates the use of short-term debt. The results are consistent with those found for the linear models given in table 4.4. Table 4.5 reveals some non-linear effects of market power on leverage in all the sample countries, with the exception of the Philippines. In Indonesia, the non-linear effect is only present for long-term and short-term leverage. The positive coefficient of q ratio and the negative coefficient of q^3 in column 'a', reveal an inverted U-shape relationship. This finding is consistent with Fairchild's (2004b) inverted U-shape effect of product differentiation on long-term debt. As the product competition increases (market power declines), a firm increases its long-term debt to soften competition. However, as the product competition reaches a certain level of intensity (the market power of the firm diminishes substantially), the predation effect begins to dominate the limited liability of debt. Conversely, the result suggests a U-shape relationship between market power and short-term debt. The limited liability effect dominates the predation effect at low levels of market power (or high levels of competition intensity). A firm employs high short-term debt at low levels of market power, to soften competition.

A cubic relationship between market power and long-term and short-term debt is found in Malaysia and Thailand. The positive coefficients of q and q^3 and the negative coefficient of q^2 for the long-term leverage equations, suggest that the predation effect dominates the limited liability at low and high market power levels, but the reverse is found for intermediate level of market power. The results for short-term leverage are consistent with the findings of Pandey (2004), which suggested that the limited liability effect dominates at low and high levels of market power, whereas the predation effect, on the other hand, is dominant for the intermediate level of market power.

The study then uses the coefficients of q , q^2 , q^3 from table 4.5 and the descriptive statistics of q ratio provided in table 4.2, to plot the relationship between market power and three types of leverage for every sample country. The following diagrams (figures 4.6, 4.7, 4.8, and 4.9) do not appear to suggest that there is a

non-linear effect of market power (q ratio) on any type of leverage, as given by the regression results in table 4.5.

Figures 4.6, 4.7, 4.8 and 4.9 show that over the ‘relevant’ ranges of the q ratio, the effect of market power on leverage in the sample countries is dominantly linear. The positive relationship between long-term leverage and q ratio is consistent with the domination of the predation effect, whereas the limited liability effect appears to be dominant for the use of short-term debt. Moreover, whilst market power has a positive effect on total leverage in Indonesia, Malaysia, and Thailand, it does not seem to have any effect on the total debt position in the Philippines. One might consider the presence of the non-linearity effect on total leverage in Thailand, which is exhibited in figure 4.9. However, the non-linearity occurs over significantly low levels of market power. The effect appears to be trivial, and one can conclude that the overall effect on total leverage in Thailand is linear and increasing with market power.

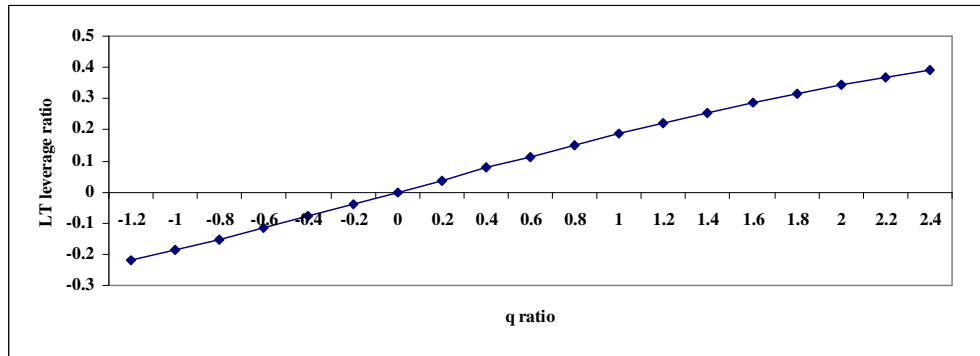
These diagrams also suggest some substitutability between short-term and long-term leverage. As the level of market power increases, a firm decreases its level of short-term debt, but on the other hand, includes more long-term debt in its capital structure. This result would appear to be consistent with the situation found in the sample countries, in that short-term borrowing is always considered a dominant source of financing. Long-term borrowing appears to be exclusively available to a firm with a high degree of dominance in the market position or with high market power. Such a firm is able to obtain long-term funding, because of its privileged connections with banks and other financial institutions. It can be observed that, occasionally, domestic banks are actually affiliated to these high market power firms, and this is certainly the case in Indonesia and Thailand (Nagano, 2003).

A firm with low market power should not commit itself to long-term borrowing, as such a commitment can create some financial inflexibility, which may prevent it from being a competitive player in the product market. For example, several repayments of long-term debt might exhaust the firm’s retained earnings, which in

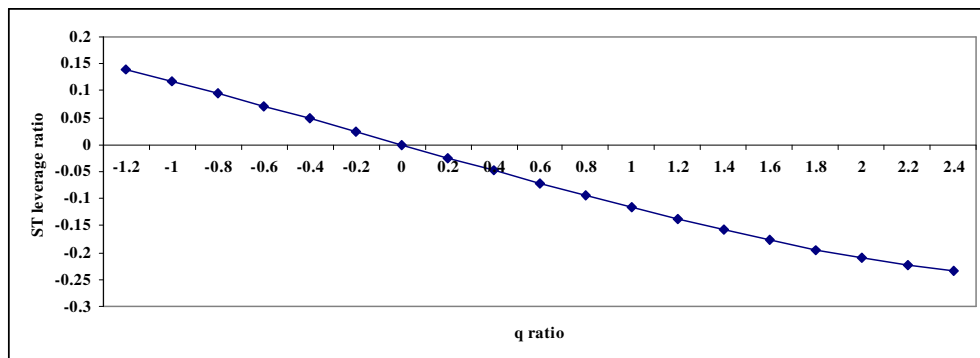
turn reduce its financial resources available for improving its market position, such as, R&D or advertising spending. The result supports the argument proposed by Myers (1977) that young firms with many potential growth opportunities, but low market power, should avoid using long-term debt in their capital structure. The finding is also consistent with Fairchild's (2004b) Bertrand competition model that states that firms with low market power generally have low long-term debt to avoid the predation threat from their less leveraged rivals. However, the presence of high intensity competition (low levels of market power) can be softened by the strategic use of short-term debt. As the level of market power increases, the predation effect becomes less dominating, and the firm is more able to substitute long-term debt for short-term debt in its capital structure. An explanation for the increasing use of long-term debt, as market power increases, is that a firm selects long-term debt to avoid the dilution of ownership (Deesomsak et al., 2004). This is applicable to the study's sample countries, in which firms with high market power generally have a concentrated ownership structure. Moreover, long-term debt can be used as a substitute for competition, in order to effectively discipline managers (Nickell et al, 1997).

Figure 4.6: The Non-Linear Effects of Market Power (Indonesia)

a) Long-term Leverage



b) Short-term Leverage



c) Total Leverage

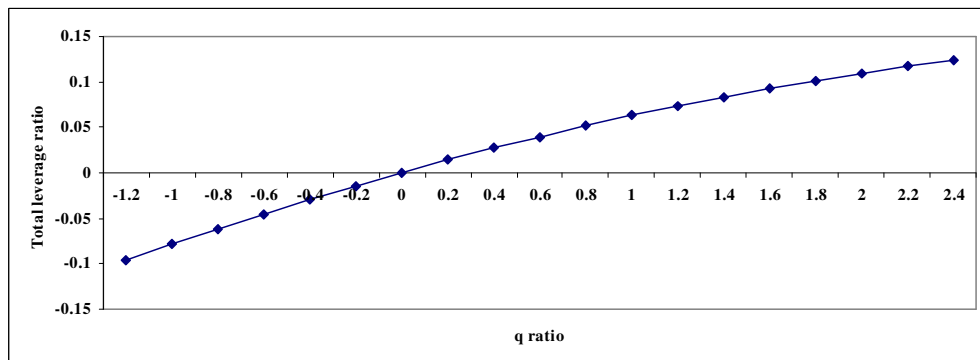
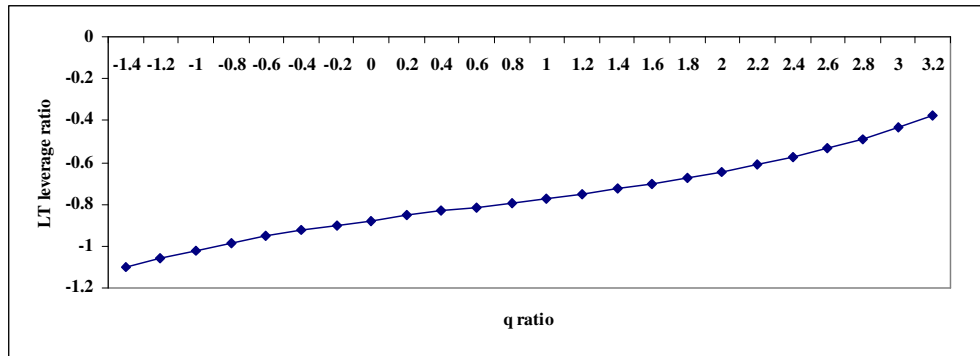
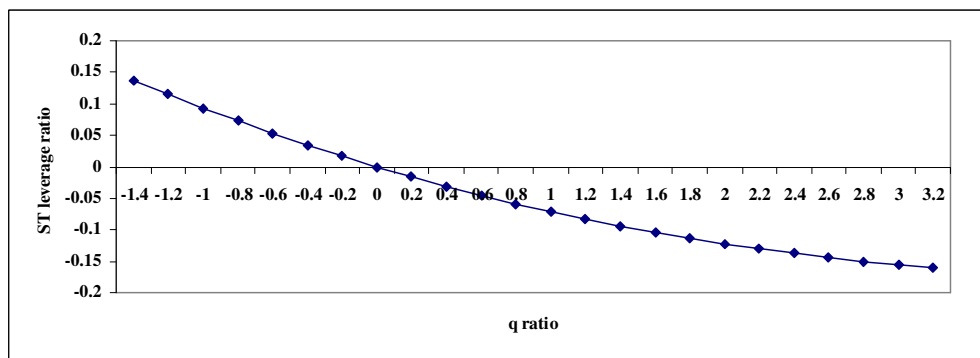


Figure 4.7: The Non-Linear Effects of Market Power (Malaysia)

a) Long-term Leverage



b) Short-term Leverage



c) Total Leverage

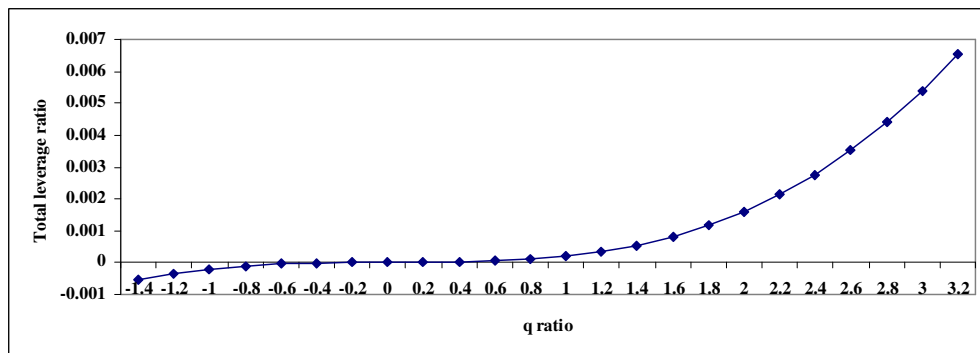
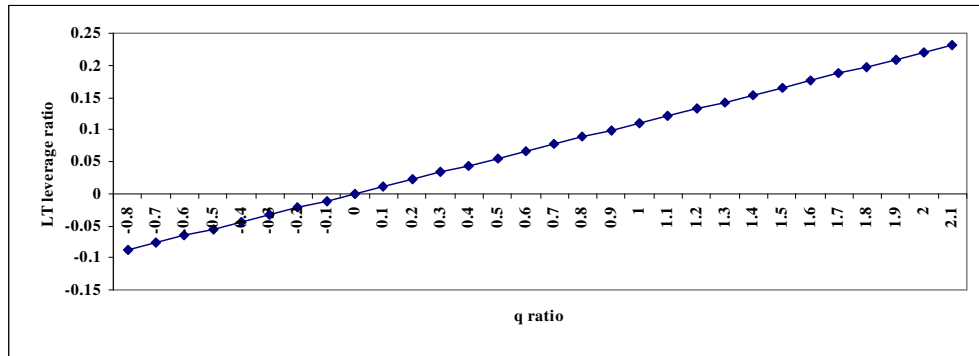
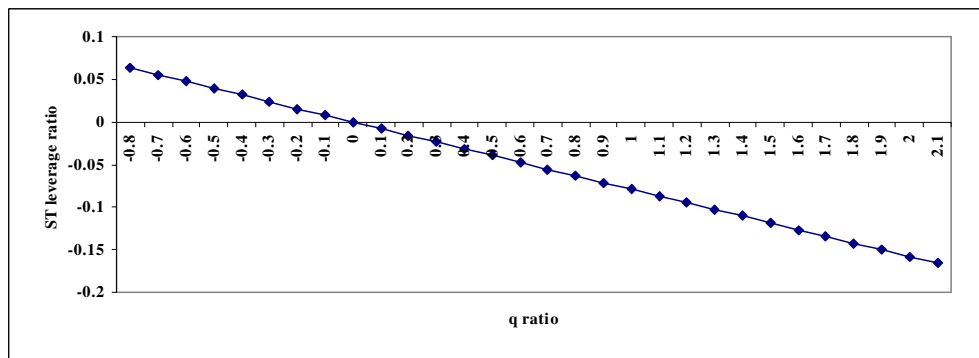


Figure 4.8: The Non-Linear Effects of Market Power (The Philippines)

a) Long-term Leverage



b) Short-term Leverage



c) Total Leverage

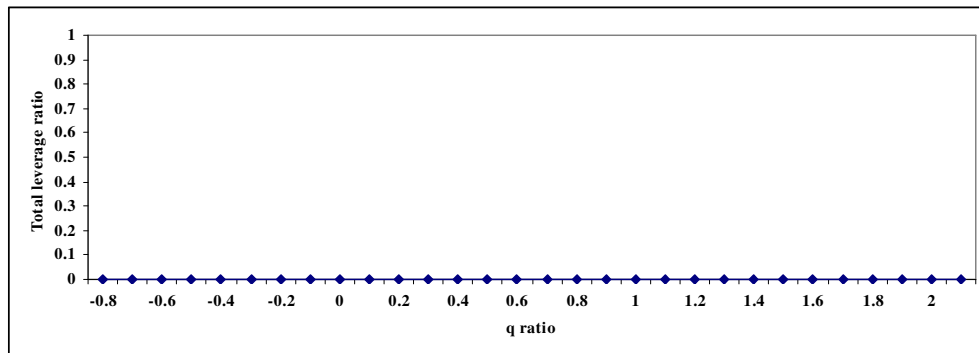
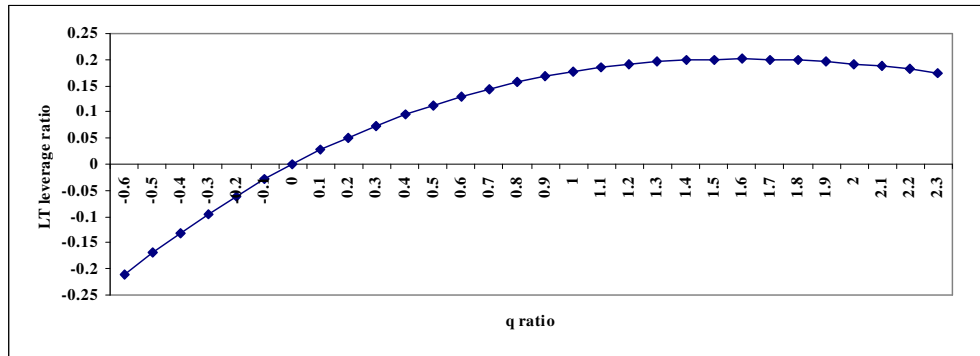
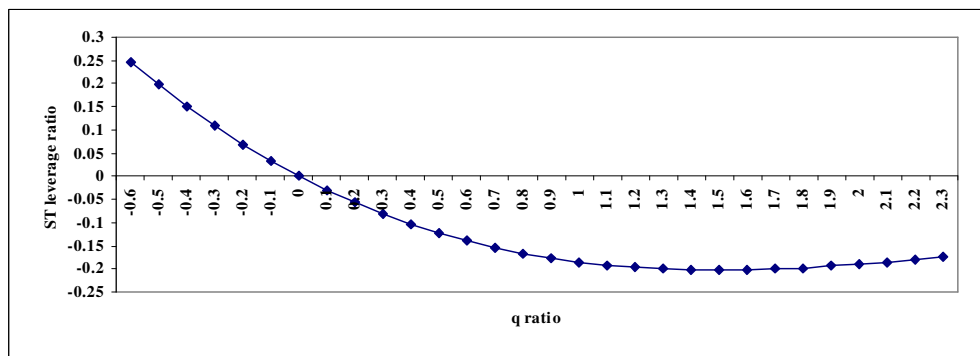


Figure 4.9: The Non-Linear Effects of Market Power (Thailand)

a) Long-term Leverage



b) Short-term Leverage



c) Total Leverage

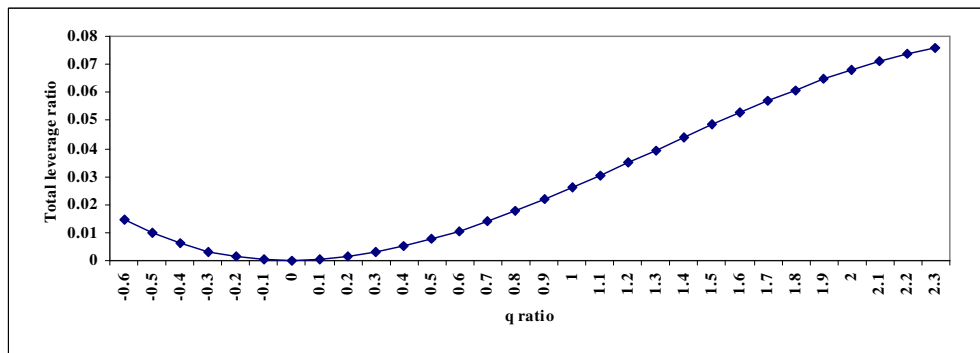


Table 4.4: Two-Way Fixed Effects Results (Linear Relationship)

	Indonesia			Malaysia			Philippines			Thailand		
	a	B	C	a	B	c	a	b	c	A	b	c
	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.
Constant	0.347 (1.13)	0.752*** (3.88)	1.10*** (3.50)	-0.921*** (-4.38)	0.044 (0.40)	-0.877*** (-3.97)	-0.118 (-0.86)	0.340*** (3.28)	0.222 (1.36)	0.344 (1.18)	-0.370 (-1.31)	-0.026 (-0.07)
q ratio	0.117*** (4.62)	-0.069*** (-4.75)	0.048** (1.99)	0.007 (1.24)	-0.012** (-2.14)	-0.005 (-0.93)	0.084*** (3.24)	-0.052*** (-4.66)	0.032 (1.31)	0.073*** (4.20)	-0.091*** (-6.46)	-0.018 (-1.27)
Profitability	-0.146** (-2.44)	-0.178*** (-2.55)	-0.324*** (-3.71)	0.009 (0.10)	-0.168** (-2.13)	-0.159 (-1.12)	-0.378*** (-2.64)	0.001 (0.01)	-0.378*** (-2.32)	-0.302*** (-3.55)	-0.271*** (-3.05)	-0.573*** (-7.25)
Tangibility	0.268*** (3.79)	-0.141** (-2.05)	0.127 (1.59)	0.138*** (3.14)	-0.060** (-2.09)	0.078 (1.64)	-0.040 (-0.50)	0.002 (0.07)	-0.038 (-0.42)	0.142** (2.55)	-0.030 (-0.59)	0.112** (2.18)
Size	-0.013 (-1.13)	-0.014** (-2.18)	-0.027** (-2.30)	0.051*** (4.75)	0.004 (0.78)	0.055*** (4.92)	0.008 (1.27)	-0.008 (-1.58)	0.0003 (0.05)	-0.012 (-0.91)	0.033** (2.43)	0.020 (1.23)
Liquidity	0.013 (1.27)	-0.049*** (-5.29)	-0.035*** (-2.82)	-0.000 (-0.06)	-0.003*** (-3.85)	-0.003** (-2.16)	-0.003* (-1.72)	-0.004*** (-4.05)	-0.007*** (-3.82)	-0.004 (-0.77)	-0.012*** (-3.48)	-0.016*** (-3.76)
Risk	-0.002 (-0.91)	-0.001 (-0.79)	-0.003 (-1.13)	0.000 (0.04)	-0.000 (-0.54)	-0.003 (-0.27)	-0.002 (-1.57)	-0.001 (-0.65)	-0.002* (-1.77)	0.000 (0.12)	0.000 (0.65)	0.000 (0.66)
R²	0.2452	0.3085	0.1498	0.1013	0.0555	0.0910	0.3241	0.1545	0.2312	0.1391	0.3761	0.3629
F test	9.08	11.95	7.05	2.89	2.93	3.39	1.18	6.15	2.38	7.23	11.51	19.29
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No.of Obs.	960	960	960	840	840	840	750	750	750	980	980	980

The *t*-statistics are the *t*-values adjusted for heteroskedasticity consistent standard errors. * denotes significant at the 10% level. ** denotes significant at the 5% level.

*** denotes significant at the 1% level.

Table 4.5: Two-Way Fixed Effects Results (Non-Linear Relationship)

	Indonesia			Malaysia			Philippines			Thailand		
	A	B	c	a	B	c	a	b	c	a	b	C
	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.
Constant	0.595** (2.22)	0.601*** (3.51)	1.195*** (4.63)	-0.877*** (-4.45)	0.014 (0.13)	-0.863*** (-3.99)	-0.167 (-1.25)	0.361*** (3.66)	0.194 (1.16)	0.165 (0.63)	-0.113 (-0.50)	0.052 (0.15)
q ratio	0.192*** (9.04)	-0.121*** (-6.00)	0.071*** (2.60)	0.114*** (6.50)	-0.082** (-2.48)	0.032 (0.98)	0.110*** (5.26)	-0.079*** (-4.35)	0.030 (1.31)	0.280*** (9.65)	-0.315*** (-13.92)	-0.035 (-1.09)
q2	-0.003 (-1.37)	-0.002 (-0.36)	-0.008 (-1.22)	-0.019*** (-4.53)	0.011** (2.13)	-0.008 (-1.54)	0.002 (0.23)	0.008 (0.94)	0.011 (0.80)	-0.114*** (-5.81)	0.150*** (9.11)	0.035** (1.98)
q3	-0.005*** (-5.71)	0.004*** (3.38)	-0.001 (-0.78)	0.001*** (3.96)	-0.0003** (-2.02)	0.0002* (1.67)	-0.002 (-1.14)	0.0001 (0.07)	-0.002 (-1.06)	0.011*** (2.80)	-0.02*** (-6.13)	-0.009** (-2.53)
Profitability	-0.186*** (-3.23)	-0.165*** (-2.69)	-0.351*** (-4.05)	-0.254*** (-2.60)	0.004 (0.04)	-0.249 (-1.57)	-0.374*** (-2.71)	0.002 (0.07)	-0.372** (-2.34)	-0.493*** (-6.65)	-0.059 (-1.32)	-0.552*** (-6.69)
Tangibility	0.196*** (3.19)	-0.099 (-1.56)	0.097 (1.25)	0.148*** (3.56)	-0.065** (-2.19)	0.083* (1.78)	-0.022 (-0.25)	-0.021 (-0.66)	-0.043 (-0.44)	0.158*** (3.56)	-0.052 (-1.51)	0.107** (2.09)
Size	-0.022** (-2.10)	-0.009 (-1.38)	-0.030*** (-2.73)	0.045*** (4.54)	0.008 (1.37)	0.053*** (4.84)	0.010 (1.48)	-0.008* (-1.71)	0.002 (0.19)	-0.006 (-0.51)	0.023** (2.11)	0.017 (1.01)
Liquidity	-0.005 (-0.51)	-0.035*** (-3.83)	-0.039*** (-3.12)	-0.001 (-0.95)	-0.002** (-2.39)	-0.003** (-2.16)	-0.004** (-2.20)	-0.004*** (-3.78)	-0.007*** (-3.73)	-0.008* (-1.90)	-0.010*** (-3.46)	-0.018*** (-4.17)
Risk	-0.002 (-1.10)	-0.001 (-0.78)	-0.003 (-1.25)	-0.0002 (-0.24)	-0.0002 (-0.33)	-0.0004 (-0.33)	-0.002 (-1.57)	-0.001 (-0.65)	-0.002* (-1.76)	0.0000 (0.06)	0.0004 (0.92)	0.0004 (0.71)
R²	0.3184	0.3461	0.1579	0.2372	0.1365	0.1080	0.3438	0.1785	0.2357	0.3449	0.604	0.3689
F test	13.51	12.14	7.34	5.10	2.77	3.93	2.11	6.86	11.94	12.73	22.66	17.70
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No.of Obs.	960	960	960	840	840	840	750	750	750	980	980	980

The *t*-statistics are the *t*-values adjusted for heteroskedasticity consistent standard errors. * denotes significant at the 10% level. ** denotes significant at the 5% level

*** denotes significant at the 1% level

4.3.1.2 The Effects of Firm-Specific Factors

Profitability

In table 4.4, the results of the two-way fixed effects estimation suggest a negative relationship between profitability and long-term debt. The *t*-values are statistically significant in every sample country, with the exception of Malaysia. The negative relationship between profitability and long-term debt was also found in: de Jong et al. (2006), Booth et al. (2001), Pandey (2001), and Prasad et al. (2001). By contrast, Fan et al. (2003) observed a positive relationship between long-term debt and profitability. Table 4.4 also reports a negative relationship between short-term debt and profitability and the effect is significant except for the Philippines. A significantly negative effect of profitability on total debt is observed in Indonesia, the Philippines, and Thailand. Although the result shows a negative effect, it is not statistically significant for Malaysian firms. This contrasts with previous studies, which have found a statistically significant and negative impact of profitability on total debt in Malaysia (Fan et al., 2003; Suto, 2003; Deesomsak et al., 2004; Booth et al. (2001); Pandey, 2001 and 2004). Wiwattanakantang (1999) and Booth et al. (2001) also observed a negative relationship between profitability and total debt, amongst Thai listed firms. Deesomsak et al. (2004) found a negative relationship, but not statistically significant one. The results suggest that the sample developing countries' firms prefer using internal sources of funding to raising external borrowing. This supports Myers's (1984) pecking order theory, but not the tax-shield theory of Modigliani and Miller (1963).

Tangibility

A positive and statistically significant effect of tangibility on long-term leverage is found in Indonesia, Malaysia, and Thailand. The finding is consistent with Suto (2003), Fan et al. (2003), Pandey (2004), and de Jong et al. (2006), but is inconsistent with Wiwattanakantang (1999) and Deesomsak et al. (2004), who contrariwise, found the relationship to be insignificant in Thailand. The positive relationship between long-term debt and tangibility is consistent with the argument that tangible assets are the most widely accepted collateral for raising

borrowing. Debt holders are more willing to give long-term loans to firms with more fixed assets. The results show a negative relationship between tangibility and short-term debt. The *t*-statistics values reveal that the relationship is statistically significant only in Indonesia and Malaysia. It is perhaps more plausible to explain the negative relationship between short-term debt and tangibility by using the maturity matching argument. Firms with less collateralised assets will rely more on short-term debt. In terms of total debt position, the results reveal a statistically significant effect only in Thailand. The collateral value of assets does not appear to be an important factor for a firm in the Philippines, for obtaining external borrowing. All in all, the findings appear to be consistent with the previous studies of capital structure, including those in developed countries that have stated that a firm with more collateralised assets (fixed assets) tends to use more long-term borrowing, in order to reduce the agency conflict between shareholders and debt holders.

Size

Some variations in the effects of size on leverage are present in the results. A significant and negative impact is found on short-term and total leverage, among Indonesian firms. This supports the agency argument that severe conflict between shareholders and debt holders in small firms can be mitigated by shortening the maturity of debt. The results also reveal a significant and positive effect on short-term debt is found in Thailand. This implies that larger firms in Thailand tend to use more short-term borrowing. This appears to contradict the agency argument. The significant and positive effect of size on long-term and total debt in Malaysia is observed. This finding is consistent with Rajan and Zingales's (1995) proposition that size can be used as an inverse proxy for bankruptcy. Larger firms are less prone to bankruptcy and incur lower cost of debt. Therefore, they have more capacity to borrow long-term debt than smaller firms. The results do not show any significant effect of size on any types of leverage in the Philippines.

Liquidity

The results reveal a significant and negative effect of liquidity on short-term and total leverage, which was similarly found in Deesomsak et al. (2004). A firm with more liquid assets tends to borrow less to avoid the agency costs of debt. These findings support the argument of Myers (1984) that a firm tends to use its liquid assets to finance an investment, in preference to raising external financing. The effect of liquidity on long-term debt is insignificant across the sample countries, with the exception of the Philippines. However, its *t*-statistic is only significant at the 10% level, suggesting that liquidity may not be an important determinant of the long-term borrowing decision among the sample firms.

Risk

The statistically insignificant *t*-values of all types of leverage, suggest that earning volatility or risk is not considered to be an important factor affecting the financial decision in the sample countries. An exception is the negative effect on total debt in the Philippines. However, the *t*-value is statistically significant only at the 10% level, with a rather insignificant coefficient of -0.002 and one can conclude that the effect is trivial. The results are consistent with evidence of most previous studies in Asian developing countries, which have shown an insignificant effect of earning volatility on leverage (de Jong et al., 2006; Wiwattanakantang, 1999; Deesomsak et al., 2004; and Fan et al., 2003). An explanation for the insignificant relationship between risk and leverage is that firms may have close connections with their lenders, which causes them to be less concerned with earning volatility. This is certainly applicable for those dominant Indonesian and Thai firms who have established their own banks.

4.3.1.3 The Industry Effect

Table 4.6 presents the industry effect of equations (8), (9), and (10) using the LSDV estimation. Additional industry dummy variables were included to examine any possible industry impact on leverage. The results generally reveal similar relationships of leverage, with firm-specific factors, as in the two-way fixed

effects model (table 4.4 and 4.5). Therefore, this sub-section will analyse only the industry effects.

The results in table 4.6 suggest that there are some industry effects among the sample countries. The magnitude of the industry effect on long-term and short-term debt varies across the industry sectors and the sample countries. In general, the industry effect has a negative impact on long-term debt, but a positive effect on short-term debt. This suggests that when taking the industry effect into account, the sample firms generally use more short-term debt than long-term debt. This is consistent with the fact that long-term debt is not considered to be a dominant source of finance in developing countries.

In terms of variations across industry sectors, panel A of table 4.6 reveals that all of the industry dummy coefficients are negative and statistically significant, with the exception of those in Indonesia and the service and the transportation sectors in Malaysia. Comparison of the coefficients of IT with manufacturing and trade in Malaysia suggests that the negative impact is more severe in the IT industry. A firm in the IT generally has less long-term debt than a firm in the manufacturing and trade industries. This appears to support Myers's (1977) argument. However, the results from the Philippines and Thailand appear to suggest otherwise. The coefficient of the real estate dummy of Thailand shows that a firm in this industry sector has comparatively less long-term debt, than a firm in other industry sectors. This might reflect the fact that the real estate sector was adversely affected by the financial crisis. Hence, firms in the sector generally adopt a more 'conservative' financial approach. Although the results in panel B show statistically significant effects for all industry sectors on short-term debt, they do not present evidence supporting the agency conflict argument, namely, that a firm whose value depends on intangible assets, such as the IT industry, will have more short-term debt than a firm with high tangible assets. In fact, a firm in the IT sector in Malaysia borrows more short-term debt than firms in the other industries. Whilst a firm in the real estate sector in Indonesia borrows more short-term debt than a firm in any other industry, the results suggest the opposite for a real estate firm in Malaysia and the

Philippines. The results reveal that a firm in the Thai agriculture industry relies more on short-term than long-term borrowing. In terms of total debt position, the results in panel C reveal that there is no industry effect on the financial decision of firms in Malaysia and in Thailand, with the exception of the mining industry. Whilst the results report significant and positive effects for all industry sectors on total debt in Indonesia, the effects are negatively significant in the Philippines.

The industry effect appears to be another important factor which determines the capital structure decision of firms in: Indonesia, Malaysia, the Philippines, and Thailand. It appears to have different impacts on the maturity of debt. The variations of the effect differ from industry to industry, and from country to country. This suggests that whilst the industry effect is another factor affecting a firm's financial decision, the country effect plays a more important role in determining capital structure.

Table 4.6: Industry Effects Using LSDV

Panel A Long-term Leverage

	Indonesia	Malaysia	Philippines	Thailand
q ratio	0.114*** (4.58)	-0.003 (-0.79)	0.067*** (2.79)	0.057*** (4.77)
Profitability	-0.345*** (-4.02)	-0.260*** (-2.95)	-0.471** (-2.37)	-0.441*** (-5.89)
Tangibility	0.258*** (7.50)	0.109*** (3.68)	0.092*** (3.64)	0.282*** (7.47)
Size	0.002 (0.45)	0.012*** (3.39)	0.025*** (6.53)	0.025*** (5.69)
Liquidity	-0.017 (-1.59)	-0.005*** (-4.35)	-0.007*** (-3.30)	-0.013*** (-4.09)
Risk	0.001 (0.59)	0.001 (0.11)	-0.000 (-0.04)	0.000 (0.54)
dAgri.	0.078 (0.53)	-0.195** (-2.45)	-0.187 (-1.61)	-0.613*** (-5.99)
dService	0.188 (1.40)	-0.111 (-1.29)	-0.539*** (-6.42)	-0.534*** (-5.39)
dIT	-0.016 (-0.11)	-0.191** (-2.44)	-0.402*** (-5.47)	-0.510*** (-5.06)
dManufacturing	-0.044 (-0.30)	-0.168** (-2.25)	-0.533*** (-5.97)	-0.542*** (-5.47)
dMining	-0.033 (-0.23)		-0.496*** (-5.95)	-0.512*** (-6.16)
dRealestate	-0.055 (-0.38)	-0.140* (-1.96)	-0.487*** (-5.97)	-0.251** (-2.23)
dTrade	-0.090 (-0.62)	-0.181** (-2.37)	-0.558*** (-7.21)	-0.594*** (-6.06)
dTransporation	0.057 (0.40)	-0.048 (-0.66)	-0.480*** (-5.86)	-0.420*** (-3.90)
dConstruction	-0.025 (-0.19)	-0.182*** (-2.60)	-0.527*** (-6.23)	
R²	0.2531	0.2136	0.4021	0.3125
F test	72.19	49.27	34.92	57.20
Prob > F	0.000	0.000	0.000	0.000
No. of Observations	960	840	750	980

The *t*-statistics are the *t*-values adjusted for heteroskedasticity consistent standard errors.

* denotes significant at the 10% level.

** denotes significant at the 5% level.

*** denotes significant at the 1% level

Table 4.6: Industry Effects Using LSDV (continued)

Panel B Short-term Leverage

	Indonesia	Malaysia	Philippines	Thailand
q ratio	-0.078*** (-5.39)	-0.020*** (-3.82)	-0.051*** (-5.58)	-0.112*** (-9.13)
Profitability	-0.170** (-2.13)	-0.283*** (-4.30)	-0.005 (-0.21)	-0.116 (-1.28)
Tangibility	-0.190*** (-5.74)	-0.028* (-1.69)	-0.027 (-1.47)	-0.259*** (-9.55)
Size	-0.012*** (-3.35)	-0.001 (-0.25)	-0.002 (-1.39)	-0.004 (-0.88)
Liquidity	-0.049*** (-8.49)	-0.006*** (-5.76)	-0.007*** (-4.79)	-0.031*** (-9.22)
Risk	-0.0001 (-0.08)	-0.000 (-0.04)	-0.000 (-0.41)	0.001 (1.36)
dAgri.	0.742*** (6.54)	0.130** (2.28)	0.270*** (3.14)	0.656*** (7.54)
dService	0.588*** (5.63)	0.090 (1.63)	0.278*** (3.40)	0.438*** (5.16)
dIT	0.679*** (5.77)	0.288*** (4.73)	0.204*** (2.94)	0.441*** (5.11)
dManufacturing	0.720*** (6.64)	0.157*** (2.90)	0.280*** (3.67)	0.517*** (5.93)
dMining	0.627*** (5.96)		0.196*** (3.11)	0.303*** (3.79)
dRealestate	0.830*** (6.35)	0.119** (2.28)	0.188*** (2.87)	0.436*** (4.79)
dTrade	0.623*** (5.23)	0.186*** (3.34)	0.345*** (4.53)	0.463*** (5.24)
dTransporation	0.512*** (4.66)	0.160*** (2.96)	0.183*** (2.60)	0.456*** (5.23)
dConstruction	0.503*** (4.76)	0.130** (2.36)	0.330*** (4.62)	
Adj. R²	0.3663	0.2079	0.2377	0.4752
F test	55.77	57.83	41.96	97.29
Prob > F	0.000	0.000	0.000	0.000
No. of Observations	960	840	750	980

The *t*-statistics are the *t*-values adjusted for heteroskedasticity consistent standard errors.

* denotes significant at the 10% level.

** denotes significant at the 5% level.

*** denotes significant at the 1% level

Table 4.6: Industry Effects Using LSDV (continued)

Panel C Total Leverage

	Indonesia	Malaysia	Philippines	Thailand
q ratio	0.037 (1.37)	-0.023*** (-5.19)	0.016 (0.69)	-0.055*** (-3.70)
Profitability	-0.515*** (-3.95)	-0.542*** (-4.25)	-0.476** (-2.25)	-0.667*** (-6.32)
Tangibility	0.067 (1.56)	0.081*** (2.69)	0.065** (2.01)	0.023 (0.54)
Size	-0.010 (-1.58)	0.011*** (2.72)	0.021*** (4.12)	0.022*** (3.87)
Liquidity	-0.066*** (-5.57)	-0.011*** (-5.46)	-0.014*** (-5.00)	-0.043*** (-8.44)
Risk	0.001 (0.46)	0.000 (0.05)	-0.001 (-0.25)	0.002 (1.36)
dAgri.	0.819*** (4.44)	-0.065 (-0.71)	0.082 (0.62)	0.043 (0.33)
dService	0.776*** (4.53)	-0.021 (-0.22)	-0.261** (-2.15)	-0.096 (-0.79)
dIT	0.663*** (3.50)	0.097 (1.14)	-0.198* (-1.83)	-0.068 (-0.54)
dManufacturing	0.676*** (3.68)	-0.011 (-0.13)	-0.252** (-2.01)	-0.024 (-0.20)
dMining	0.595*** (3.38)		-0.299*** (-2.72)	-0.208** (-1.99)
dRealestate	0.774*** (4.16)	-0.021 (-0.25)	-0.299*** (-2.71)	0.185 (1.31)
dTrade	0.534*** (2.84)	0.005 (0.05)	-0.213* (-1.81)	-0.131 (-1.04)
dTransporation	0.570*** (3.14)	0.112 (1.36)	-0.297*** (-2.62)	0.036 (0.26)
dConstruction	0.478*** (2.72)	-0.052 (-0.62)	-0.197* (-1.71)	
R²	0.2455	0.3091	0.3061	0.377
F test	150.52	147.64	113.36	163.62
Prob > F	0.000	0.000	0.000	0.000
No.of Observations.	960	840	750	980

The *t*-statistics are the *t*-values adjusted for heteroskedasticity consistent standard errors.

* denotes significant at the 10% level.

** denotes significant at the 5% level.

*** denotes significant at the 1% level

4.3.2 The Dynamic Panel Model

The results in table 4.7 show a significant and positive effect of the one-period lagged dependent variables, for all the sample countries. The statistically significant and positive coefficients are consistent with the previous findings of de Miguel and Pindado (2001) and Antoniou et al. (2008). The coefficients are between 0 and 1, implying that the leverage ratios converge to their target over time. The results certainly show the existence of dynamism in the capital structure decision, and that the sample firms do adjust their leverage ratios towards the target levels. The speed of adjustment is found by $1 - \text{coefficient of the lagged dependent variable}$. For instance, the speed of adjustment of long-term leverage for Indonesian firms is $1 - 0.399 = 0.601$. Alternatively, the coefficient can be interpreted as the cost of adjustment.

The speed of adjustment tends to vary across types of leverage, and from one sample country to another. For long-term leverage, the speeds of adjustment for sample firms in Malaysia, the Philippines, and Thailand are approximately 0.31-0.38. Indonesian firms have the fastest adjustment speed, 0.6, which is almost double that of firms in the other sample countries. The speeds of adjustment for short-term leverage across sample countries are not very different. They range from the lowest of 0.57 in Malaysia to the highest of 0.64 in the Philippines. This suggests that the adjustment costs for short-term leverage are lower than those for long-term leverage. The sample firms adjust their short-term leverage towards the target level faster than their long-term leverage. Whilst those in Malaysia appear to adjust their long-term leverage and short-term leverage at the slowest speed, their speed of adjustment for total leverage is the highest among the sample countries. Overall, the results appear to support the theories of capital structure that state that a firm selects its optimal debt and it adjusts its actual debt level towards its target level and the speed of adjustment varies according to types of debt.

Table 4.7: Dynamic Panel Model Results

Panel A

Long-term Leverage	Indonesia	Malaysia	Philippines	Thailand
Lagged LT lev.	0.399*** (12.02)	0.691*** (25.41)	0.618*** (56.06)	0.617*** (21.64)
Q ratio	0.101*** (6.58)	-0.004 (-0.60)	0.102*** (7.40)	0.075*** (9.56)
Profitability	-0.164** (-5.08)	0.089*** (2.98)	-0.477*** (-40.99)	-0.342*** (-7.84)
Tangibility	0.13* (1.68)	0.070*** (2.72)	0.075*** (2.73)	0.015*** (4.10)
Size	-0.015 (-1.31)	-0.003 (-0.27)	0.01*** (3.31)	-0.047*** (-3.89)
Liquidity	0.042*** (4.28)	0.002** (2.49)	-0.001 (-1.24)	0.012*** (4.83)
Risk	0.000 (0.13)	0.0001* (1.71)	-0.002*** (-4.42)	-0.001*** (-3.75)
J-statistic	43.84	36.88	35.36	47.01
Instrument rank	42.000	42.000	42.000	42.000
P-value	0.173	0.428	0.50	0.104
Number of Obs.	768	672	600	784

Panel B

Short-term Leverage	Indonesia	Malaysia	Philippines	Thailand
Lagged ST lev.	0.411*** (20.36)	0.431*** (42.55)	0.357*** (16.45)	0.426*** (16.16)
Q ratio	-0.067*** (-5.92)	-0.002** (-2.17)	-0.044*** (-11.86)	-0.053*** (-9.68)
Profitability	-0.189** (-5.04)	-0.075*** (-4.65)	-0.011* (-1.76)	-0.227*** (-9.24)
Tangibility	-0.122** (-2.18)	-0.051** (-2.26)	-0.019 (-1.41)	-0.105*** (-3.04)
Size	-0.008 (-1.33)	0.009** (2.50)	-0.008** (-2.22)	0.011** (1.99)
Liquidity	-0.053*** (-7.50)	-0.001 (-1.53)	-0.003** (-2.37)	-0.021*** (-3.25)
Risk	-0.000 (-0.30)	0.000 (0.40)	-0.001** (-1.98)	-0.0001 (-0.67)
J-statistic	40.56	38.89	34.71	42.93
Instrument rank	42.000	42.000	42.000	42.000
P-value	0.276	0.341	0.529	0.199
Number of Obs.	768	672	600	784

Table 4.7: Dynamic Panel Model Results (continued)

Panel C

Total Leverage	Indonesia	Malaysia	Philippines	Thailand
Lagged Total lev.	0.635*** (26.94)	0.467*** (19.69)	0.633*** (55.19)	0.715*** (22.86)
q ratio	0.017 (1.15)	-0.003 (-0.70)	0.048*** (4.89)	0.031*** (4.84)
Profitability	-0.368*** (-5.83)	-0.062 (-1.33)	-0.482*** (-31.02)	-0.54*** (-12.10)
Tangibility	0.056 (0.78)	0.028 (0.65)	-0.019 (-0.64)	0.12** (2.36)
Size	-0.027 (-1.54)	0.029** (2.34)	0.001 (0.13)	0.014 (1.15)
Liquidity	-0.001 (-0.13)	-0.001** (-2.06)	-0.001 (-1.57)	-0.0004 (-0.07)
Risk	0.001 (0.92)	0.0002 (0.50)	-0.003*** (-3.52)	-0.001** (-2.06)
J-statistic	43.55	32.40	39.95	34.79
Instrument rank	42.000	42.000	42.000	42.000
P-value	0.1811	0.64	0.299	0.526
Number of Obs.	768	672	600	784

* denotes significant at the 10% level.

** denotes significant at the 5% level.

*** denotes significant at the 1% level.

The results of market power and firm-characteristic factors are similar to those of the static model. Positive and statistically significant coefficients of q ratio for Indonesia, the Philippines and Thailand, suggest that the predation effect dominates the use of long-term leverage. At the low level of market power, in which the competitive interaction is intense, sample firms avoid the predation threat by using long-term debt sparingly.

The presence of intense competition is softened by the use of short-term debt, as shown by a significant and negative relationship between short-term leverage and the q ratio. The result also suggests that the limited liability effect dominates the use of short-term debt among the sample countries. Whilst an insignificant relationship between the q ratio and total leverage for sample firms in the Philippines and Thailand is found in the static model, the results of the dynamic panel model show a statistically significant and positive relationship for both these sample countries.

Overall, the results of the dynamic panel model appear to be consistent with the static model and it can be posited that there exists some substitutability between the use of short-term and long-term debt. At low levels of market power, a firm in this region tends to use short-term debt for strategic purposes. Long-term debt, resulting in a longer lasting obligation for the firm, would expose it to predation threats from its rivals, when facing intense competition. As its market power increases, a firm becomes more established in the product market. With its monopoly power, which does not necessarily refer to the firm being in the monopoly market structure, the firm is more able to obtain long-term financial sources.

The negative relationship between profitability and leverage is consistent with the pecking order theory of Myers (1984). However, the result in panel B shows a positive and statistically significant effect of profit on long-term leverage for Malaysia, which was previously observed to be insignificant in the static model. The result suggests that sample firms in Malaysia tend to borrow more long-term

debt, to lessen the free cashflow problem (Jensen, 1986) or for tax-shield benefit (Modigliani and Miller, 1963). A significant and positive relationship between tangibility and long-term leverage is found in all the sample countries. This suggests that the sample firms use tangible assets as collateral for obtaining long-term finance. The relationship is statistically significant for the Philippines, for which this was previously found to be insignificant in the static model. The results are also consistent with the maturity matching argument. A firm with less collateral assets tends to rely more on short-term debt. This is shown by the negative relationship between short-term leverage and tangibility.

Whilst the results of the static model showed that size was a determinant factor of capital structure for Indonesian firms, the results of the dynamic panel model suggest otherwise. The results are consistent for Malaysian firms, as a positive relationship is found in both models, that is, larger firms tend to borrow more. The dynamic panel model results for the Philippines contradict those of the static model. The effect was found insignificant for all types of leverage in the latter, however, a statistically significant relationship in the former is observed. Larger firms in the Philippines tend to borrow more long-term and reduce their use of short-term debt. The opposite is, however, observed for the sample firms in Thailand, where larger firms tend to use more short-term borrowing and less long-term debt.

Similar to the static model, the dynamic panel model also finds a negative relationship between short-term leverage and liquidity. This supports Myers's (1984) pecking order theory that states that a firm with high liquid assets tends to use less short-term borrowing. However, the results of the dynamic panel model show a positive relationship between liquidity and long-term leverage. The result is statistically significant in all the sample countries, with the exception of the Philippines, and this would appear to contradict the pecking order theory. An explanation for the observed positive effect is that firms in sample countries might use high liquid assets as their collateral for obtaining long-term debt. In the static model, the study concluded that risk might not be an important determinant factor.

By contrast, the results of the dynamic panel model show a statistically significant effect of risk on long-term and total leverage, among the sample firms in the Philippines and Thailand. The negative relationship suggests that the presence of financial distress or the high volatility of earning causes a firm to borrow less.

Unfortunately, the statistical software package, EViews, used for the dynamic panel model does not provide the R^2 value, therefore, the study is not able to suggest whether the inclusion of the lagged dependent variable improves the explanatory power of the model. The p-values of the Sargan test allow for the study to conclude that the instruments are valid. The null hypothesis of valid over-identifying restriction is thus not rejected.

4.4 Summary

The study has considered firm-level data for four developing countries in the Southeast Asia region, in order to contribute to the research in capital structure, which has lately paid a lot of attention to developing countries. Furthermore, this researcher wishes to contribute to the on-going research in capital structure and the product market. The chapter has empirically examined the effects of market power on three types of debt. Given the availability of the data, the simplified q ratio has been used as the proxy of market power. Long-term, short-term, and total debt, all normalised by the book value of total assets, have been used as the capital structure proxies. Firm-specific factors, namely: profitability, tangibility, size, liquidity, and risk have also been included as control variables. In addition, industry dummy variables have been used to examine the industry effects on capital structure.

The notion of market power in the study differs from previous related studies, notably Rathinasamy et al. (2000) and Pandey (2004). In their work, market power is taken to mean the operation term of market structure. In this study, market power reflects the intensity of competition. At high levels of market power, the intensity of competition is low. This concept of market power relates

closely to the theoretical models developed in the previous chapter, based on Fairchild (2004b). A firm with high market power is considered to have local monopoly power, owing to its highly differentiated product.

Using the two-way fixed effects model to account for the unobserved firm effect and the time effect, the results have shown that market power has different effects on debt, depending on its maturity. When considering the results in relation to levels of market power, the effect of market power has not been found to be non-linear, as proposed by Pandey (2004), and Fairchild (2004b). Moreover, it was found that the limited liability effect dominates the use of short-term debt, whereas the presence of the predation effect determines the use of long-term debt. The explanation for the substitutability between short-term and long-term debt as the level of market power increases, is also offered by the concentrated ownership structure, the managerial disciplinary mechanism, and the characteristics of the sample countries.

Evidence has been shown supporting the pecking order theory and the agency costs argument. The results are generally consistent with the findings of prior studies, in both developed and developing countries. Furthermore, the industry effect is arguably another important factor which determines capital structure. In addition, a two-step generalised method of moments (GMM) technique has been employed to examine the presence of dynamism in the capital structure decisions of sample firms. The results of the dynamic panel model suggest that sample firms adjust their debt level towards the target level. The speed of adjustment does not only vary from country to country, but it also varies according to the types of leverage.

However, like many previous empirical studies, this research has its limitations. Owing to the lack of continuous financial data, many listed firms had to be excluded from the study. As a result, the data available comprised less than half of the listed firms from each of the sample countries. Titman and Wessels (1988) argued that most empirical studies of capital structure have had to deal with the

problem of defining variables. This study is no exception. One might question the use of the simplified version of Tobin's q as the market power proxy. However, the researcher strongly believes that, although the use of Tobin's q is still controversial, many studies have justified its use as the proxy of market power. However, it is not the aim of this thesis to contribute to this debate. Moreover, this researcher is of the belief that there is no variable that can be used as a perfect proxy for any of the factors that determine capital structure.

Chapter 5

Conclusion

It is now widely acknowledged that firms' financial decisions and product market strategies may be inter-related. Brander and Lewis's (1986) seminal limited liability approach, in which short-term debt toughened product market behaviour under Cournot competition, sparked an extensive research agenda. As discussed in the literature review chapter, initial modelling attempts employed a homogenous-products approach. Recently, there has been growing recognition that product differentiation/market power may affect the firm's use of debt in the product market. However, these theoretical works have mostly concentrated on the use of short-term debt in the product market.

Inspired by the empirical study of Pandey (2004), this thesis aimed to investigate the relationship between capital structure (particularly long-term debt) and market power/product differentiation. In doing so, the thesis developed Fairchild's (2004b) theoretical work.¹⁹ In chapter 3, theoretical models were developed to examine the relationship between product differentiation, long-term debt, and product market competition. The empirical study in chapter 4 investigated whether the relationship between capital structure and market power is linear (positively or negatively) or non-linear. Thus, the thesis not only contributes theoretically to the on-going research into capital structure and product market competition, its empirical findings also contribute to the debate on the nature of the relationship between capital structure and market power. In addition, the findings of the empirical study contribute to the research into the determinants of capital structure in developing countries.

¹⁹ This thesis developed Fairchild's (2004b) analysis as follows. He analysed a non-spatial Bertrand competition model of debt and product market competition. In contrast, this thesis' non-spatial approach employed Cournot competition. The thesis then proceeds to consider spatial models (employing a Bertrand approach).

The theoretical models in chapter 3 demonstrated that long-term debt softens product market competition, either by inducing the leveraged firm to decrease output in the non-spatial model or to increase prices in the spatial model. The results are consistent with previous studies (for example, Glazer's (1994) long-term debt in Cournot competition with homogenous products and Fairchild's (2004b) Bertrand competition with differentiated products). The softening effect of long-term debt in the theoretical models in this thesis is due to the myopic behaviour of the leveraged firm. The models show that by issuing long-term debt, a firm becomes more short-termist (myopic) by focusing on short-term profits at the expense of the future market share forgone (similar to Dasgupta and Titman, 1998).

The theoretical models also demonstrated that the use of long-term debt in the product market depends on the exogenous degree of market power. In the non-spatial one-shot game, both firms select the all-equity (zero debt) financial contract in equilibrium, regardless of the degree of market power. Thus, the model formally proved Dasgupta and Titman's (1998) intuitive conjecture that '*with quantity competition, firms will be all-equity financed in the absence of other benefits associated with debt*'.

The model further demonstrated that the firms face a prisoner's dilemma for high levels of product market competition. That is, although they both choose the all-equity contract in equilibrium, they would both be better off by selecting the long-term debt contract. This naturally leads to an analysis of collusion over the financial structure in a repeated-game framework.

The results in the spatial model demonstrated that long-term debt is decreasing in market power, which is represented by the transportation cost per unit. In the horizontally differentiated cases, firms simultaneously decrease their long-term debt levels as their market power/product differentiation reduces (the predation effect). The models demonstrate that the domination of the predation effect is more significant in the quadratic transportation cost case, because firms face more

intense product market competition from the supply side of the market (firms are located closer to one another) and from the demand side of the market (a decrease in the level of the transportation cost per unit).

In the vertically-differentiated model, firms could invest in improving product quality, prior to choosing their financial structure and product market behaviour. Depending on the parameters of the model, there was a possibility of asymmetric debt levels in equilibrium (with the firm that invested in quality being able to choose a higher debt level than its low-quality rival).

In summary, the theoretical models have demonstrated that the relationship between capital structure and product market competition is a complex one. It is affected by factors such as whether competition is Bertrand competition or Cournot competition, the nature of the modelling approach (non-spatial or spatial), and whether the model considers a one-shot game or repeated interactions between firms, the maturity of debt, that is short-term debt or long-term debt (the theoretical models focus on the latter). The complexity in the nature of the relationship between market power and capital structure naturally led to an empirical investigation in chapter 4.

The empirical study in chapter 4 employed firm-level data on four Southeast Asian tiger economies. Tobin's q was used as the market power proxy, whilst long-term leverage ratio, short-term leverage ratio, and total leverage ratio were used as the capital structure proxies. The results of the empirical study showed that the relationship between capital structure and market power is arguably linear. When one considers the type of debt, then it can be observed that market power is positively related to long-term leverage, but is negatively related to short-term leverage. The results suggested that while the predation effect dominates for the use of long-term debt, the limited liability effect influences the use of short-term debt. The findings of the empirical study also suggested some substitutability between short-term and long-term leverage.

The theoretical models and the results in this thesis have emphasised the importance for future researchers to continue analysing the complex relationship between capital structure and product market competition. This research area has built upon traditional capital structure theories, which only consider how a firm makes its financial decision, without a consideration of the product market decision. The thesis has clearly demonstrated that when the firm makes the financial decision, it should not only take its own but also its rivals' product market decision into consideration.

Following de Bettignies and Brander (2007) and Fairchild (2007b), the theoretical models in this thesis can be considered at both a descriptive and normative level. The models have been based on the assumption (as is standard in most research in economics and finance) that firms are run by fully rational utility-maximising managers. The firms' managers are assumed to have the ability to completely anticipate their product market actions (and those of their rivals) given their financial decisions. If we assume that the world really behaves in this way, then the models in this chapter could be considered as descriptive.

However, behavioural economists are increasingly recognising that agents' decision-making may be subject to limitations and psychological biases; that is, they may be less than fully-rational. A recent growing body of research in behavioural corporate finance argues that the psychological biases of managers can bias the financial decision (Fairchild, 2007b). Taking this viewpoint, the thesis' existing rationally-based models may be considered as normative/prescriptive. Managerial biases may be incorporated into the models to provide a more accurate description of the way that firms may actually behave.

There is a growing area of research incorporating behavioural factors into corporate finance decision-making (see Fairchild (2007a) for a review). However, as far as this author is aware, there is no research that analyses the effect of behavioural factors when considering the relationship between product market competition and financial decisions. Hence, incorporating managerial biases into

this thesis' models may provide rich conclusions compared with the fully-rational model. For example, we could consider the effect of managerial bounded rationality and cognitive biases.²⁰ The models could assume that one firm's manager is overconfident, and examine how this would affect his decision in the product market, given the chosen long-term debt level. Intuitively, given that the overconfident manager believes that he has higher ability than his rival manager, the former might take on more long-term debt even at intense levels of potential product market competition since he underestimates predation. In addition, the non-spatial model with collusion could be augmented by incorporating the behavioural issues of 'fairness' and 'trust', to see how this would affect firms' decisions to collude in the common financial contract.

Furthermore, the theoretical models have assumed that firms face the same discount rates. It would be interesting to consider the case where firms have different levels of myopia (hyperbolic discounting).

Finally, we could consider bounded rationality, whereby one firm is unaware of the product market implications of its financial decisions. For example, consider a firm that is unaware of the presence of a competitive rival, and therefore chooses its debt level due to standard corporate finance reasons (for instance, to discipline managers in an agency framework, or to provide a positive signal to the market in a world of informational asymmetries). Its rival is aware of the impending product market competition. The author conjectures that the boundedly-rational firm may choose an excessively high debt level, and be subject to predation from its less leveraged rival. Hence, it may be possible to obtain asymmetric debt levels due to behavioural reasons.

²⁰ The former refers to limits on their ability to process information sufficiently to make fully rational decisions, whilst the latter refers to systematic deviations from full rationality (de Bettignies and Brander, 2007).

As mentioned in chapter 4, the lack of data has led the study to use Tobin's q ratio as the market power proxy (as justified by Pandey 2004). An avenue for future empirical research is to use an alternative proxy, such as the Lerner index. The study could also employ a product competitiveness measure such as the competitive strategy measure (CSM) of Sundaram et al (1996) in order to empirically investigate the effect of capital structure on product market competition. Furthermore, the empirical study could augment the static model by including interaction terms, for instance, (q ratio * industry sector dummy variables) as independent variables, to capture potentially different sensitivities of capital structure to market power across industry sectors.

In summary, this thesis has provided important theoretical and empirical developments of the research into the relationship between firms' financial decisions and product market behaviour, and has identified important areas for future research.

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Appendix A

List of Sample Firms

Indonesia

- **Agriculture**

1. Astra Agro Lestari Tbk, PT
2. Bakrie Sumatera Plantation Tbk, PT
3. Cipendawa Agroindustri Tbk, PT
4. Japfa Comfeed Indonesia Tbk, PT
5. Multibreeder Adirama Indonesia Tbk, PT
6. Perusahaan Perkebunan London Sumatra Indonesia Tbk, PT
7. Sierad Produce Tbk, PT
8. Sinar Mas Agro Resources and Technology Tbk, PT

- **Construction**

9. Bakrieland Development Tbk, PT
10. Indonesia Prima Property Tbk, PT

- **IT and information**

11. Astra Graphia Tbk, PT
12. Indosat Tbk, PT
13. Telekomunikasi Indonesia (Persero) Tbk, PT

- **Manufacturing**

- Apparel**

14. Ever Shine Tex Tbk, PT
15. Indo Acidatama Tbk, PT
16. Pan Brothers Tbk, PT

- Automotive**

17. Astra Otoparts Tbk, PT
18. Indomobil Sukses International Tbk, PT
19. Multi Prima Sejahtera Tbk, PT
20. Selamat Sempurna Tbk, PT

- Cement and glass**

21. Intikeramilk Alamasri Tbk, PT
22. Mulia Industrindo
23. Semen Gresik (Persero) Tbk, PT
24. Surya Toto Indonesia Tbk, PT

- Computing**

25. Metrodata Electronics Tbk, PT

- Fabricated material**

26. Indospring Tbk, PT
27. Kedaung Indah Can Tbk, PT
28. Kedawung Setia Industrial Tbk, PT
29. Lion Metal Works Tbk, PT
30. Prima Alloy Steel Universal Tbk, PT

Food and beverages

- 31. Aqua Golden Mississippi Tbk, PT
- 32. Bahtera Adimina Samudra Tbk, PT
- 33. BAT Indonesia Tbk, PT
- 34. Cahaya Kalbar Tbk, PT
- 35. Fast Food Indonesia Tbk, PT
- 36. Gudang Garam Tbk, PT
- 37. Prasadha Aneka Niaga Tbk, PT
- 38. Sekar Laut Tbk, PT
- 39. Siantar Top Tbk, PT
- 40. Suba Indah Tbk, PT
- 41. Tiga Pilar Sejahtera Food Tbk, PT
- 42. Tunas Baru Lampung Tbk, PT

Household appliances

- 43. GT Kabel Indonesia Tbk, PT
- 44. Jembo Cable Company Tbk, PT
- 45. Langgeng Makmur Industri Tbk, PT
- 46. Sumi Indo Kabel Tbk, PT
- 47. Tembaga Mulia Semanan Tbk, PT

Iron and steel

- 48. Alumino Tbk, PT
- 49. Citra Tubindo Tbk, PT
- 50. Jakarta Kyoei Steel Works Limited Tbk, PT
- 51. Timah (Persero) Tbk, PT

Leather

- 52. Primarindo Asia Infrastructure Tbk, PT
- 53. Sepatu Bata Tbk

Machinery

- 54. Enseval Putera Megatrading Tbk, PT
- 55. Tira Austenite Tbk, PT
- 56. United Tractors Tbk, PT

Paper

- 57. Argha Karya Prima Industry Tbk, PT
- 58. Surabaya Agung Industri Pulp & Kertas Tbk, PT

Pharmaceutical

- 59. Kalbe Farma Tbk, PT
- 60. Lautan Luas Tbk, PT
- 61. Mandom Indonesia Tbk, PT
- 62. Merck Tbk, PT
- 63. Modern Internasional Tbk, PT
- 64. Mustika Ratu Tbk, PT
- 65. Resource Alam Indonesia Tbk, PT
- 66. Sorini Corporation Tbk, PT
- 67. Tempo Scan Pacific Tbk, PT
- 68. Trias Sentosa Tbk, PT

Plastic and rubber

- 69. Asiaplast Industries Tbk, PT
- 70. Berlina, Tbk PT
- 71. Dynaplast Tbk, PT
- 72. Gajah Tunggal Tbk, PT
- 73. Polychem Indonesia Tbk, PT

Textile

- 74. Argo Pantes Tbk, PT
- 75. Panasia Filament Inti Tbk, PT
- 76. Sunson Textile Manufacturer Tbk, PT

Wood

- 77. Barito Pacific Timber Tbk, PT
- 78. Daya Sakti Unggul Corporindo Tbk, PT

- **Mining**

- 79. Aneka Tambang (Persero) Tbk, PT
- 80. Bumi Resources Tbk, PT
- 81. Citatah Tbk, PT
- 82. Medco Energi Internasional Tbk, PT

- **Realestates**

- 83. Jakarta Setiabudi International Tbk, PT
- 84. Mulialand Tbk, PT

- **Service**

- 85. Hotel Sahid Jaya International Tbk, PT
- 86. Pudjiadi & Sons Tbk, PT

- **Trade**

- 87. Matahari Putra Prima Tbk, PT
- 88. Ramayana Lestari Sentosa Tbk, PT
- 89. AKR Corporindo Tbk, PT
- 90. Alfa Retailindo Tbk, PT
- 91. Asia Grain International Tbk, PT
- 92. Hexindo Adiperkasa Tbk, PT
- 93. Inter Delta Tbk, PT

- **Transportation and warehouse**

- 94. Citra Marga Nusaphala Persada Tbk, PT
- 95. Humpuss Intermoda Transportasi Tbk, PT
- 96. Steady Safe Tbk, PT

Malaysia

- **Agriculture**

- 1. Glenealy Plantations (Malaya) Berhad
- 2. Golden Hope Plantations Berhad
- 3. Guthrie Ropel Berhad
- 4. Highlands & Lowlands Berhad
- 5. IOI Corporation Berhad
- 6. Keck Seng (Malaysia) Berhad
- 7. Kuala Lumpur Kepong Berhad
- 8. Kulim (Malaysia) Berhad
- 9. Kurnia Setia Berhad
- 10. Leong Hup Holdings Berhad
- 11. Lingui Developments Berhad
- 12. Negri Sembilan Oil Palms Bhd
- 13. United Plantations Berhad

- **Construction**
 - 14. Dolomite Corporation Berhad
 - 15. Hock Seng Lee Berhad
 - 16. Ken Holdings Berhad
- **IT and information**
 - 17. Nanyang Press Holdings Berhad
- **Manufacturing**
 - Apparel**
 - 18. John Master Industries Berhad
 - 19. Ramatex Berhad
 - Automotive**
 - 20. Delloyd Ventures Berhad
 - 21. Oriental Holdings Berhad
 - 22. UMW Holdings Berhad
 - Cement and glass**
 - 23. Goh Ban Huat Bhd.
 - 24. Hume Industries (Malaysia) Berhad
 - 25. Kia Lim Berhad
 - 26. Kim Hin Industry Berhad
 - 27. YTL Cement Berhad
 - Chemical/ Pharmaceutical**
 - 28. Chemical Company of Malaysia Berhad
 - Fabricated metal**
 - 29. Aluminium Company of Malaysia Berhad
 - 30. Choo Bee Metal Industries Berhad
 - 31. Globetronics Technology Bhd
 - 32. Kian Joo Can Factory Berhad
 - 33. KKB Engineering Berhad
 - 34. Lion Corporation Berhad
 - 35. Yung Kong Galvanising Industries Bhd.
 - Food and beverages**
 - 36. Ajiya Berhad
 - 37. Dutch Lady Milk Industries Berhad
 - 38. JT International Berhad
 - 39. KFC Holdings (Malaysia) Bhd
 - 40. Khee San Berhad
 - 41. Nestlé (Malaysia) Berhad
 - 42. Yeo Hiap Seng (Malaysia) Bhd.
 - Household appliances**
 - 43. Fiamma Holdings Berhad
 - 44. GUH Holdings Berhad
 - 45. Leader Universal Holdings Berhad
 - Iron and steel**
 - 46. FACB Industries Incorporated Berhad
 - Paper**
 - 47. Muda Holdings Berhad
 - 48. Public Packages Holdings Berhad

Petrochemical

- 49. Eastern Pacific Industrial Corporation Berhad
- 50. Esso Malaysia Berhad

Plastic and rubber

- 51. Formosa Prosonic Industries Berhad
- 52. Integrax Berhad
- 53. Rubberex Corporation (M) Berhad

Wood

- 54. Jaya Tiasa Holdings Berhad

- **Real estate**

- 55. Bandar Raya Developments Berhad
- 56. Damansara Realty Berhad
- 57. Golden Plus Holdings Berhad
- 58. Gopeng Berhad
- 59. IGB Corporation Berhad
- 60. IOI Properties Berhad
- 61. Johor Land Berhad
- 62. Negara Properties (M) Berhad
- 63. RB Land Holdings Berhad

- **Service**

- 64. Resorts World Bhd
- 65. Grand Central Enterprises Bhd
- 66. Landmarks Berhad

- **Trade**

- 67. Sapura Resources Berhad
- 68. SHH Resources Holdings Berhad
- 69. Suiwah Corporation Bhd
- 70. Tan Chong Motor Holdings Berhad
- 71. AIC Corporation Berhad
- 72. Fraser & Neave Holdings Bhd
- 73. Ipimuda Berhad
- 74. Kossan Rubber Industries Bhd
- 75. Lafarge Malayan Cement Berhad
- 76. Yee Lee Corporation Bhd

- **Transportation and warehouse**

- 77. Global Carriers Berhad
- 78. Halim Mazmin Berhad
- 79. Konsortium Logistik Berhad
- 80. Nationwide Express Courier Services Berhad
- 81. Nepline Berhad
- 82. PDZ Holdings Bhd
- 83. Tamadam Bonded Warehouse Berhad
- 84. Transocean Holdings Bhd

The Philippines

- **Agriculture**

1. Vitarich Corporation

- **Construction**

2. Concrete Aggregates Corp
3. DMCI Corp
4. Eei Corporation

- **IT and information**

5. Abs-Cbn Broadcasting Corporation
6. APC Group, Inc
7. Benpres Holdings Corporation
8. Ipeople Inc
9. Ivantage Corporation
10. Liberty Telecoms Holdings, Inc.
11. Manila Bulletin Publishing Corporation
12. Manila Broadcasting Company
13. MIC Holdings Corporation
14. Philippine Long Distance Telephone Company
15. Pilipino Telephone Corporation
16. Premiere Entertainment Productions, Inc.

- **Manufacturing**

- **Cement**

17. Fortune Cement Corporation
18. Mariwasa Manufacturing Inc

- **Chemical and Pharmaceutical**

19. Interphil Laboratories Inc
20. LMG Chemicals Corporation
21. Mabuhay Vinyl Corporation

- **Computing**

22. Ionics Inc
23. Music Semiconductors Corporation
24. Panasonic Manufacturing Philippines Corporation
25. Solid Group Inc

- **Food and beverages**

26. Alaska Milk Corporation
27. Bogo-Medellin Milling Co Inc
28. Cosmos Bottling Corporation
29. Ginebra San Miguel Inc
30. JG Summit Holdings
31. Jollibee Foods Corporation
32. Liberty Flour Mills Inc
33. RFM Inc
34. San Miguel Corporation
35. San Miguel Pure Foods Company Inc
36. Tanduay Distillers Inc

- **Machinery**

37. Philippine Aerosol Container Inc

Paper

- 38. Picop Resources Inc
- 39. Steniel Manufacturing Corporation

Petroleum

- 40. Oriental Petroleum and Minerals Corporation
- 41. Petron Corporation

Textile

- 42. Filsyn Corporation

- **Mining**

- 43. APC Group, Inc.
- 44. Basic Energy Corporation
- 45. Benguet Corporation
- 46. Crown Equities Inc
- 47. Dizon Copper Silver Mines, Inc.
- 48. Lepanto Consolidated Mining Company
- 49. Manila Mining Corporation
- 50. Semirara Mining Corporation
- 51. Vulcan Industrial & Mining Corporation

- **Real estate**

- 52. A. Brown Company Inc
- 53. Alsons Land Corporation
- 54. Cebu Holdings Inc
- 55. Cebu Property Ventures and Development Corp.
- 56. Crown Equities Inc
- 57. Edsa Properties Holdings Inc
- 58. Empire East Land Holdings Inc
- 59. Ever-Gotesco Resources & Holdings, Inc.
- 60. Keppel Philippines Properties Inc
- 61. Mabuhay Holding Corporation
- 62. Megaworld Corporation
- 63. Metro Pacific Corporation
- 64. Philippine Realty & Holdings Corporation
- 65. Philippine Estates Corporation
- 66. Pryce Corporation
- 67. San Miguel Properties Inc
- 68. Sm Prime Holdings Inc

- **Trade**

- 69. Philippine Seven Corporation
- 70. Macondray Plastics Inc

- **Transportation and warehouse**

- 71. Aboitiz Transport System Atsc Corporation
- 72. Keppel Philippines Marine, Inc.
- 73. Lorenzo Shipping Corporation

- **Service**

- 74. Grand Plaza Hotel Corporation
- 75. Manila Jockey Club Inc

Thailand

- **Agriculture**

1. United Palm Oil Industry PCL

- **IT and information**

2. AIS PCL
3. Amarin Publishing PCL
4. GMM Grammy PCL
5. Nation Multimedia Group PCL
6. Siam Sport Syndicate PCL

- **Manufacturing**

- Apparel**

7. Castle Peak Holdings PCL
8. D.T.C. Industries PCL
9. Hua Thai Manufacturing PCL
10. Textile Prestige PCL
11. Thai Wacoal PCL
12. Union Pioneer PCL
13. Union Textile Industries PCL

- Automotive**

14. Asian Marine PCL
15. Thai Rung Union Car PCL

- Cement and glass**

16. Siam City Cement PCL
17. Tipco Asphalt PCL

- Chemical**

18. AJ Plast PCL
19. Thai Central Chemical PCL

- Electronics**

20. CVD Entertainment PCL
21. Draco PCB PCL
22. Hana Microelectronics PCL
23. KCE Electronics PCL
24. Muramoto Electron (Thailand) PCL

- Fabricated metal**

25. Alucon PCL

- Food and beverages**

26. Asian Seafood PCL
27. Crown Seal PCL
28. Haad Thip PCL
29. Kiang Huat Sea Gull Trading Frozen Food PCL
30. Lee Feed Mill PCL
31. Malee Sampran PCL
32. Pakfood PCL
33. Patum Rice Mill And Granary PCL
34. S.Khonkaen Food Industry PCL
35. Surapon Foods PCL
36. Thai Agri Foods PCL
37. Thai President Foods PCL

38. Thai Theparos Food Products PCL
39. Thai Union Frozen Products PCL
40. Thai Vegetable Oil PCL
41. Thai Wah Food Products PCL
42. Tropical Canning (Thailand) PCL
43. United Flour Mill PCL

Household appliances

44. Charoong Thai Wire & Cable PCL
45. Modernform Group PCL

Iron and steel

46. Furukawa Metal (Thailand) PCL
47. Sahaviriya Steel Industries PCL

Leather

48. Chai Watana Tannery Group PCL
49. C.P.L. Group PCL

Machinery

50. Kulthorn Kirby PCL
51. Patkol PCL

Paper

52. Thai Cane Paper PCL
53. Thai Carbon Black PCL
54. Thai Packaging & Printing PCL

Pharmaceutical

55. Jack Chia Industries (Thailand) PCL
56. The Aromatics (Thailand) PCL
57. Vinythai PCL
58. Yong Thai PCL

Plastic and rubber

59. General Engineering PCL
60. Goodyear (Thailand) PCL
61. Inoue Rubber (Thailand) PCL
62. Sri Trang Agro-Industry PCL
63. Thai Nam Plastic PCL
64. Thai O.P.P. PCL
65. Thai Plastic And Chemicals PCL
66. Thai Rubber Latex Corporation (Thailand) PCL

Wood

67. Vanachai Group PCL

- **Mining**

68. Tongkah Harbour PCL

- **Real estate**

69. Supalai PCL

- **Service**

70. Aikachol Hospital PCL
71. Bamrungrad Hospital PCL

- 72. Bangkokdusit Hospital PCL
- 73. Chiangmai medical Hospital PCL
- 74. Nonthavej Hospital PCL
- 75. Mahachai Hospital PCL
- 76. Vibhawadi Hospital PCL
- 77. Shrangila Hotel PCL
- 78. Asia Hotel PCL
- 79. Centralplaza Hotel PCL
- 80. Dusit Thani Hotel PCL
- 81. Laguna Resort PCL
- 82. Mandarin Hotel PCL
- 83. Royal Orchid Hotel PCL

- **Trade**

- 84. Newcity (Bangkok) PCL
- 85. O.C.C. PCL
- 86. Siam Makro PCL
- 87. Berli Jucker PCL
- 88. Big C Supercenter PCL
- 89. Boutique Newcity PCL
- 90. I.C.C. International PCL
- 91. Robinson Department Store PCL
- 92. The Siam Pan Group PCL
- 93. White Group PCL

- **Transportation and warehouse**

- 94. Jutha Maritime PCL
- 95. Precious Shipping PCL
- 96. Regional Container Lines PCL
- 97. Safari World PCL
- 98. Sub Sri Thai Warehouse PCL

Appendix B

One-Way Fixed Effects Results (The Linear Models)

	Indonesia			Malaysia			Philippines			Thailand		
	a	b	c	a	B	c	a	b	c	a	b	c
	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.
Constant	0.507*** (2.69)	0.966*** (5.25)	1.473*** (6.00)	-0.740*** (-4.98)	0.004 (0.03)	-0.736*** (-4.40)	-0.086 (-0.72)	0.274*** (3.29)	0.188 (1.36)	1.227*** (4.99)	0.058 (0.27)	1.285*** (4.74)
q ratio	0.111*** (11.59)	-0.068*** (-7.34)	0.042*** (3.40)	0.007* (1.92)	-0.012*** (-3.99)	-0.005 (-1.24)	0.082*** (8.66)	-0.047*** (-7.29)	0.034*** (3.18)	0.055*** (6.07)	-0.095*** (-12.12)	-0.040*** (-4.01)
Profitability	-0.163*** (-4.27)	-0.193*** (-5.20)	-0.356*** (-7.18)	0.025 (0.50)	-0.170*** (-4.04)	-0.145** (-2.54)	-0.380*** (-14.52)	0.011 (0.60)	-0.369*** (-12.39)	-0.285*** (-5.03)	-0.230*** (-4.70)	-0.515*** (-8.26)
Tangibility	0.245*** (4.22)	-0.176*** (-3.11)	0.069 (0.91)	0.161*** (4.76)	-0.065** (-2.31)	0.096** (2.52)	-0.032 (-0.74)	0.004 (0.13)	-0.028 (-0.58)	0.166*** (3.24)	-0.043 (-0.96)	0.123** (2.19)
Size	-0.019*** (-2.73)	-0.023*** (-3.38)	-0.041*** (-4.62)	0.040*** (5.28)	0.007 (1.09)	0.046*** (5.49)	0.007 (1.26)	-0.007* (-1.73)	0.0004 (0.06)	-0.055*** (-4.90)	0.011 (1.08)	-0.045*** (-3.61)
Liquidity	0.011* (1.65)	-0.052*** (-7.80)	-0.041*** (-4.58)	-0.002 (-1.29)	-0.003** (-2.16)	-0.004*** (-2.74)	-0.003 (-1.25)	-0.004*** (-2.68)	-0.007*** (-2.73)	-0.007** (-2.05)	-0.018*** (-5.77)	-0.025*** (-6.40)
Risk	-0.001 (-1.03)	-0.000 (-0.13)	-0.001 (-0.89)	0.000 (0.05)	-0.000 (-0.70)	-0.0004 (-0.47)	-0.002 (-1.22)	-0.000 (-0.25)	-0.002 (-1.23)	0.0002 (0.35)	0.001 (1.39)	0.001 (1.41)
R²	0.2113	0.1969	0.117	0.0658	0.0469	0.0761	0.3136	0.1005	0.2168	0.0888	0.3232	0.2822
F test	38.32	60.39	18.94	8.81	6.14	10.30	50.93	12.45	30.86	14.23	69.71	57.39
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
$\chi^2(6)$	57.74	5.58	21.94	41.43	13.56	67.83	10.54	3.93	8.32	13.38	39.32	22.51
No.of Obs.	960	960	960	840	840	840	750	750	750	980	980	980

* denotes significant at 10% level. ** denotes significant at 5% level. *** denotes significant at 1% level.

One-Way Random Effects Results (The Linear Models)

	Indonesia			Malaysia			Philippines			Thailand		
	a	b	c	a	B	c	A	b	c	a	B	C
	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.	LT lev.	ST lev.	Total lev.
Constant	0.241 (1.63)	0.802*** (5.39)	1.062*** (5.38)	-0.285*** (-2.67)	0.076 (0.85)	-0.258** (-2.02)	-0.293*** (-3.26)	0.207*** (3.05)	-0.068 (-0.63)	0.156 (0.96)	0.183 (1.34)	0.517*** (2.59)
q ratio	0.111*** (11.92)	-0.070*** (-7.86)	0.040*** (3.34)	0.003 (0.76)	-0.013*** (-4.66)	-0.01** (-2.52)	0.078*** (8.60)	-0.047*** (-7.55)	0.032*** (3.06)	0.051*** (5.71)	-0.102*** (-13.40)	-0.048*** (-4.91)
Profitability	-0.205*** (-5.38)	-0.187*** (-5.13)	-0.384*** (-7.81)	-0.026 (-0.53)	-0.185*** (-4.54)	-0.02*** (-3.54)	-0.391*** (-14.85)	0.010 (0.58)	-0.378*** (-12.63)	-0.33*** (-5.85)	-0.222*** (-4.60)	-0.543*** (-8.76)
Tangibility	0.297*** (6.54)	-0.174*** (-3.80)	0.118* (1.95)	0.144*** (5.06)	-0.049** (-2.09)	0.095*** (2.87)	0.036 (1.04)	0.002 (0.07)	0.026 (0.64)	0.246*** (6.22)	-0.147*** (-4.41)	0.112** (2.38)
Size	-0.009* (-1.70)	-0.017*** (-3.07)	-0.026*** (-3.68)	0.017*** (3.18)	0.003 (0.64)	0.022*** (3.50)	0.016*** (3.77)	-0.004 (-1.12)	0.012** (2.31)	-0.007 (-0.93)	0.007 (1.18)	-0.008 (-0.91)
Liquidity	0.002 (0.28)	-0.051*** (-8.02)	-0.047*** (-5.56)	-0.003** (-2.34)	-0.003*** (-3.06)	-0.006*** (-4.04)	-0.004** (-2.00)	-0.005*** (-3.29)	-0.009*** (-3.69)	-0.001*** (-2.58)	-0.019*** (-6.67)	-0.027*** (-7.12)
Risk	-0.001 (-0.52)	-0.0001 (-0.10)	-0.001 (-0.54)	0.0001 (0.13)	-0.0003 (-0.52)	-0.0002 (-0.28)	-0.002 (-1.02)	-0.0003 (-0.28)	-0.002 (-1.11)	0.0003 (0.41)	0.001 (1.52)	0.001 (1.50)
R²	0.2043	0.2962	0.1125	0.0511	0.0450	0.0618	0.3077	0.0994	0.2113	0.0681	0.3190	0.2744
No.of Obs.	960	960	960	840	840	840	750	750	750	980	980	980

* denotes significant at 10% level. ** denotes significant at 5% level. *** denotes significant at 1% level.